The FOUNDRY

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Foundry Convention Huge Success

Twenty-Fourth Annual Meeting of American Foundrymen's Association at Philadelphia Takes Decisive Action on Important Present Day Problems—Technical Program and Exhibition Eclipse Previous Events

LAST year with the whole concentrated strength of the allies directed toward breaking the then yielding German lines, foundrymen gathered in Milwaukee from the remote corners of the country to learn how they might better their products and increase production for the urgent needs of war. This year, Philadelphia welcomed the largest gathering the world has ever known of men identified with the castings industry. As before they were drawn together by the crying need for production, the fabricating and casting of metals in greater quantities, but with an essential difference. Production still is the motive, but reconstruction instead of destruction is to be the result. In attendance and magnitude, the twenty-fourth annual meeting of the American Foundrymen's association, held Sept. 29 to Oct. 3 has never been approached. This meeting might well be called the Reconstruction Convention. Never before have so many journeyed from overseas to meet with American foundrymen and to exchange views on subjects of mutual interest. Men of prominent position in the industrial life of England, France, Norway, Spain, Japan, Australia, India, Scotland and Brazil, attested by their presence to the esteem in which American foundry practice is held abroad and the renown of the American Foundrymen's association. These foreign visitors, with over 3000 from the furtherest borders of the United States and Canada were more than repaid by the wealth of information available through the technical sessions, the unprecedented show of foundry supplies and equipment and the cordial hospitality of Philadelphia, the host. International amity, taken together with that spirit of cordiality which governs wherever foundrymen are gathered together, was proof against even the

CARLTON S. KOCH

The new president of the American Foundrymen's association brings to his new tasks a sound practical engineering experience based upon years of training. Upon completing his college work at the Massachusetts Institute of Technology he became associated with William Sellers & Co., Philadelphia. Later he was assistant manager of the Titusville, Pa., plant of the American Radiator Co. He left this company to become manager of the Franklin and later the Sharon works of the American Steel Foundries. In 1906, Mr. Koch formed the Fort Pitt Steel Castings Co., McKeesport, Pa., and has since that time been its president and general manager. He has been active in the Pittsburgh Foundrymen's association.

annoyance caused to some few by the shortage of hotel accomodations due to the unprecedented attendance. Good feeling was more than ever in evidence. The technical sessions broke all previous records for attendance. Each meeting was better attended than any corresponding gathering at any previous convention and a full discussion followed each paper presented.

The Commercial Museum offered a floor space which was over 40 per cent greater than that available at any previous show, but despite this fact and although the allotments of the larger space users were cut down proportionately, a number of companies were unable to secure space. Over 60,000 square feet was occupied by every class of equipment and appurtenance which finds place within the foundry, machine-shop or mill. Exhibitors were more than usually well repaid for their effort and expense in bringing these materials and machines before the convention. Both native and foreign visitors were actuated by a sincere desire to learn more of the mechanical progress shown in the industry, and actual buying of equipment on the floor was noted more at this exhibit than at any previously held. More than 200 firms had space in the exhibit hall.

The technical sessions were grouped in such a manner that the visiting delegate was able to select those meetings in which he was most vitally interested, reserving for himself the time which otherwise would have been consumed in listening to matters extraneous to his line.

Questions of efficiency, particularly as relates to lavor-saving, demanded constant attention during the war. That these still are paramount is shown by the active interest in those papers which covered problems of handling materials in and about the foundry. The labor question, viewed from a broad standpoint, offered one of the most interesting subjects betore the convention. This was evidenced by the attendance at one session devoted to industrial problems, concerned with personnel, training and management.

The steel session which was one of the most largely attended of the sectional meetings, considered technical problems of the steel foundry, both as to economy of melting processes and also the metallurgical influences of the different elements on cast steel.

The malleable session was characterized by the great attention devoted to melting methods and to discussion of the comparative value of the fuel mediums. Some unusually valuable papers on the metallurgical phases of the industry were presented, and discussed by a great number of members present.

The entertainment features provided by the Philadelphia Foundrymen's association, its committees and the citizens of Philadelphia, were particularly enjoyable. Every effort was made to show that the city appreciated the return of association for its third convention in the city. The ladies of the party were entertained by the women's committee under chairmanship of Caroline Devlin Begley.

In the launching held at the huge Hog Island plant of the American International Shipbuilding Co., the foundrymen were accorded a rare honor. The wife of their president, Mrs. A. O. Backert, as sponser, chrisened one of the great Hog Island products AFOUNDRIA in the presence of a great number of the visitors who were taken to the scene on a vessel chartered for the occasion.

The banquet, held on Thursday night, was a fitting climax to the entire week. It was here that the larger concepts of the association, and the influence of its principles upon manufacturers of castings both at home and abroad was voiced. Distinguished speakers, representing England, France and the United States expressed sentiments which will serve to continue the comradeship of the war, during which, throughout all nations, the foundry industry was united in a common purpose of mutual advancement and for greater efficiency.

Labor discussions of almost all kinds are avoided by the American Foundrymen's association, which rightly regards its field as dealing with the technical phases of the castings industry. Therefore the action of the convention in calling upon the senate committee on education and labor to search out the threat of alien action in the steel strike is especially significant. This action was taken on a communication ratified by a unanimous vote of the members. This communication appears in full on a subsequent page.

The opening session of the convention convened with a reported registration of over 800 members and guests, including manufacturers from England, France, Norway, Japan, Spain, Australia and India. In the annual address of the president, which is presented on another page of this issue, A. O. Backert, Cleveland, emphasized the international character of the meeting and paid tribute to the cordiality of feeling represented among the foundrymen of the world. A letter from Thomas H. Firth, past president of the British Foundrymen's association, acknowledged the prominent service of American foundrymen including W. J. Keep, Richard Moldenke and Thomas D. West. He earnestly asserted that increased production is the only solution to be found for present industrial problems.

In welcoming the visitors to Philadelphia, Thomas Devlin, president of the local foundrymen's association, recounted the early history of the Philadelphia and American Foundrymen's associations. He declared that in his 65 years' experience the opportunities for success in the foundry industry had never been better than they are at present.

John A. Penton paid a tribute to Mr. Devlin's active interest and designated him as the premier foundryman of the world. In a short address, Edward James Cattell, statistician of the city of Philadelphia, reviewed the achievements of the Quaker city in industry and in science. Dwelling on the present labor unrest, he spoke optimistically stating that not more than 3 per cent of the workers of the country are touched by foreign heresy.

J. P. Pero, Missouri Malleable Castings Co., East St. Louis, Ill., past president of the association, replied to the addresses of welcome on behalf of the members and guests. He emphasized the growing importance of the literature of the industry contributed through the technical papers

New Officers

President:
C. S. KOCH,
Fort Pitt Steel Castings Co., McKeesport, Pa.

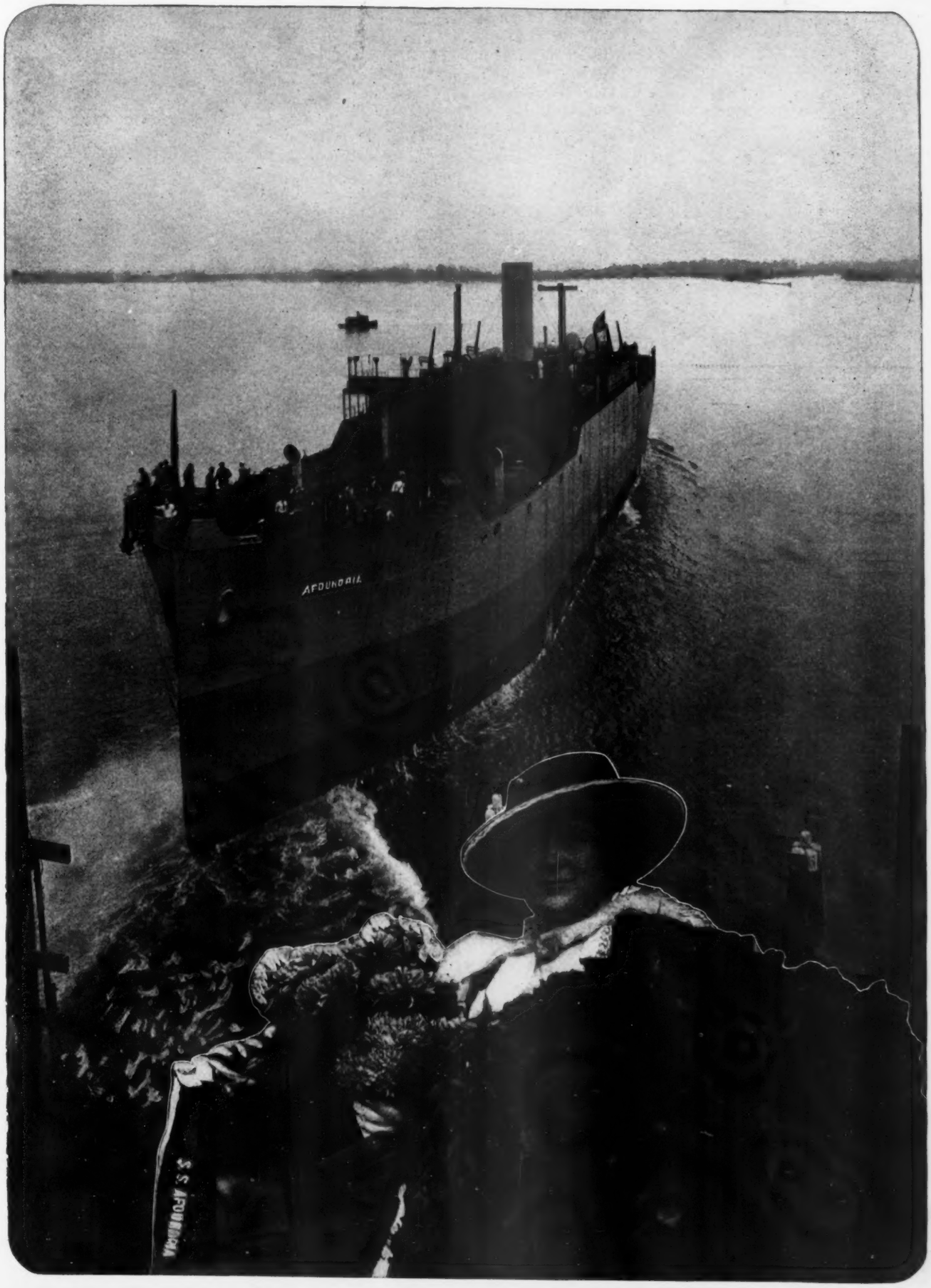
Vice President:
W. R. BEAN,
Eastern Malleable Iron Co., Naugatuck, Conn.

Secretary-Treasurer:
C. E. HOYT,
Chicago.

Directors

(In addition to the above)

H. R. Atwater, Cleveland-Osborn Mfg. Co., Cleveland.
A. O. Backert, The Penton Publishing Co., Cleveland.
R. A. Bull, Duquesne Steel Foundry Co., Coraopolis, Pa.
H. A. Carpenter, General Fire Extinguisher Co., Providence, R. I.
S. B. Chadsey, Massey-Harris Co., Ltd., Toronto, Ont.
A. E. Howell, Phillips & Buttorff Mfg. Co., Nashville, Tenn.
W. A. Janssen, American Steel Foundries, Chicago.
S. T. Johnston, S. Obermayer Co., Chicago.
C. R. Messinger, Sivyer Steel Casting Co., Milwaukee.
V. E. Minich, American Foundry Equipment Co., New York.
J. P. Pero, Missouri Malleable Iron Co., East St. Louis, Ill.
A. B. Root Jr., Hunt-Spiller Mfg. Corp., Boston.
J. Roy Tanner, Pittsburgh Valve Foundry & Construction Co., Pittsburgh.



THE AFOUNDRIA, NAMED IN HONOR OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION, WAS LAUNCHED AT THE HOG ISLAND YARD OF THE AMERICAN INTERNATIONAL SHIPBUILDING CORP., SEPT. 30—SHE WAS CHRISTENED BY MRS. A. O. BACKERT, WIFE OF THE ASSOCIATION'S PRESIDENT

W. R. BEAN
Vice President, A. F. A.

prepared and presented at the annual meetings of the association and these fully discussed.

The nominating committee appointed by the president was composed of B. D. Fuller, Niagara Falls, N. Y.; R. A. Bull, Coraopolis, Pa.; J. P. Pero, East St. Louis, Ill.; A. E. Howell, Nashville, Tenn., and Stanley G. Flagg, III, Philadelphia.

With a total registration of members and guests of over 2500 shown on the secretary's cards, the second day's technical sessions were greeted by a large attendance. The general meeting was held in the ball room of the Bellevue-Stratford with Mr. Backert as chairman, while the steel session was held in an adjoining room with R. A. Bull, Duquesne Steel Co., Coraopolis, Pa., presiding.

The first paper on the general program was "Audible Signals in Foundries," by Professor Vladimir Karapetoff, Cornell university, Ithica, N. Y.

In the very full discussion following this paper, W. T. Perry, Bay City Mich., pointed out the probable value of a loud speaking telephone which in addition to calling the person sought, delivers the desired message at the same time. In rebuttal Professor Karapetoff called attention to the difficulty of obtaining distinct enunciation with the loud speaking telephone. He cited its use in numerous passenger stations at the present time.

"The Care of Foundry Equipment," by G. L. Grimes was the next paper to be presented. W. C. Brigg's paper on combining hoisting apparatus with molding machines to secure the most efficient results was accompanied by a series of interesting slides on actual installations. The handling problem further was amplified by H. L. McKinnon, C. O. Bartlett & Snow Co., Cleveland, who dwelt on the modern application of power to sand handling and conveying and refered to installations now in every day use.

H. H. Haley, American Foundry Equipment Co., New York, discussed the application of concrete to foundry molding floors and recommended certain practice to follow. In the discussion Lambert T. Ericson, chief engineer, Jennison-Wright Co., Toledo, O., suggested wood blocks for foundry flooring. He pointed out the cleanliness and ease of construction which made it possible to lay a wood block floor with a minimum of interruption to normal plant operations.

The report of the committee on costs was read by the chairman and a resolution was proposed and passed authorizing the publication of the principles of the American Foundrymen's association cost system in the proceedings and in pamphlet form for distribution among the members. C. E. Knoeppel's paper, "Uniform Methods of Cost Accounting" was read in abstract.

Maj. Frank B. Gilbreth, Providence, R. I., delivered an address on "The One Best Way to Do Work," which was illustrated by motion pictures. He criticized the existing emphasis which is placed on judgment, characterizing judgment as the result of many contacts with the wrong way of doing things. The investigation of methods by the application of motion picture time studies was strongly recommended. The speaker recounted the mode of applying motion picture study to foundry operations. He told how the best workman is chosen for each operation studied, and how by the application of the cross-sectioned background and the split-second clock, each movement is precisely recorded. This system has been found to induce a greater effort on the part of the workman, and it is stated his work is so improved that output in many cases is increased in the ratio of two to one and in some cases five to one. In closing, the speaker said that this country, to compete with manufacturers abroad, and particularly with the Orient, must send to the four corners of the earth in search of the one best way, just as now our agricultural investigators go all over the world seeking better grades of grain, fruit and vegetables.

Three sessions of the American Foundrymen's association were held

C. E. HOYT
Secretary-Treasurer, A. F. A.

Visitors From Overseas

FROM the standpoint of nationalities represented this year's convention surpassed all previous annual meetings. The cosmopolitan aspect of the event was not only noticeable on the registration bulletins where the names and addresses of many foreign guests appeared, but also at the exhibition where a number of European products were displayed and at the annual banquet where official representatives of England and France participated in the program. England, Scotland, Norway, France, India, Java, Japan, Spain and Australia were represented. Among the guests from overseas were: John R. Hyde and W. H. I. Bailey, Robert Hyde & Son, Ltd., Sheffield, Eng.; N. M. Brown and William Hudson, Lion Foundry Co., Ltd., Kirkintilloch, Scotland; H. Roe, Adaptable Molding Machine Co., Birmingham, Eng.; James Teason, Ruston & Hobston, Lincoln, Eng.; R. V. Patterson, Smith-Patterson Co., Ltd., Blaydon-on-Tyne, Eng.; James Potts, I. Taylor & Sons, Ltd., London, Eng.; Frank Somers, Walter Somers & Co., Ltd., Halesowen, Eng.; R. M. Chemez, Angus Co., Ltd., Calcutta, India; S. Frivik, E. Sunde & Co., Christiana, Norway; R. W. Williams, Sidney Williams & Co., Rockhampton, Australia; J. J. Bratt, Java; T. Sakaqushi, T. Sakaqushi, Oiaru, Japan; Abdon Corquoda, A. Corquoda, Barcelona, Spain; T. Murayanna, Tobatta Foundry Co., Tobatta, Japan; J. Vigne, Tropenas Converter Co., Sao Paulo, Brazil, and George Komorowski, Gizod Electric Steel Works, Ugine, France.

simultaneously on Thursday morning at the Bellevue-Stratford hotel. The industrial session was held in the red room and was presided over by J. T. Connelley, commissioner of labor for the state of Pennsylvania. The malleable session, presided over by W. R. Bean, was held in the clover room and more than 250 foundrymen attended the gray iron session which was held Thursday morning. W. A. Janssen, American Steel Foundries, Chicago, presided as chairman. George P. Fisher, Whiting Foundry Equipment Co., Harvey, Ill., read a paper on the application and use of the side blow converter in the iron foundry. He pointed out the low initial cost of this melting unit and furnished statistics showing the amount of steel produced in the United States covering a period of three years. This paper was abstracted in the Oct. 1 issue of THE FOUNDRY.

A paper entitled "Cerium in Cast Iron" was read by Dr. Richard Moldenke, Watchung, N. J. This rare metal is one of a group which Doctor Moldenke has been investigating with a view of developing a practical deoxidizing agent. W. A. Janssen asked if cerium is added to the molten iron in the form of a ferroalloy or in its natural state. Doctor Moldenke replied that it is added as a ferroalloy and that the best method of adding it to the molten iron is to break it into small pieces and drop them in the spout when the metal is tapped.

Homer F. Staley, United States bureau of standards, Washington, read a paper on testing clays for foundry use. He referred to the work which the bureau is doing along these lines and stated the conclusions which have been derived from the work already done. R. F. Harrington, Hunt-Spiller Mfg. Corp., Boston, remarked that Mr. Staley entirely ignored the merits of the die test in determining the plasticity of clay which Doctor Moldenke has advocated. Mr. Staley replied that in his opinion the die test is not reliable, inasmuch as a definite amount of penetration does not always indicate a definite bonding power. Doctor Moldenke, while agreeing that the die test is not perfect, maintained that it still is good enough for all practical purposes and is within the means of even the most modest foundryman. He declared that a simple practical method of determination is needed. He stated that he believes too much emphasis is placed on the theoretical phase of the work and urged a more practical application so that the man who was accustomed to dig clay in his own back yard can satisfy himself that it is suitable for the purpose intended. In reply to a question regarding German fireclay, which has been used so extensively for crucibles, and the native American clays, Mr. Staley said that there is no single American clay similar to the German material, but that it is possible to combine some of the native clays and obtain a mixture just as satisfactory as the best German clay.

Henry Traphagen, Toledo Steel Casting Co., presented a paper on the educational value of the scrap pile. He made a strong plea for exercising common sense in solving foundry problems instead of depending altogether on the results of chemical analysis. An abstract of this paper appeared in the Oct. 1 issue of THE FOUNDRY.

A Great Inconvenience

SIR ELLIS W. HUME-WILLIAMS, in his brilliant address at the annual banquet, urged the United States to send goods to China soon if it wishes to participate in trade with that country. He illustrated this point by an Irish story.

A visitor in the Emerald Isle, relying upon the customary lateness of the trains on the island, was surprised one day upon reaching the station to find that his train had departed on time. He turned to the porter for an explanation. "Has the train gone?" he asked.

"It has, sor," replied that typical son of Erin, "the trains we have are ginerally late but now and agin one of thim comes and goes on time to the great inconvanience of the public."

"Delay in establishing trade relations in the far east," continued Sir Ellis, "likewise will prove 'a great inconvenience' to the exporters."

Although many availed themselves of the final opportunity to visit and inspect the show at the Commercial Museum, a full attendance heard the Friday morning program. Reversing the usual order of procedure, President Backert at once installed the newly elected officers, introducing Carlton S. Koch, Fort Pitt Steel Castings Co., Pittsburgh, president; W. R. Bean, Eastern Malleable Iron Co., Naugatuck, Conn., vice president, and C. E. Hoyt, Chicago, secretary-treasurer. Mr. Koch took the chair and later resigned it in favor of Mr. Bean. By unanimous assent, the retiring president, A. O. Backert, was elected to honorary membership in the association, and Thomas Devlin, Thomas Devlin & Co., Philadelphia, a patriarch in the industry, was unanimously accorded a similar tribute.

The scheduled program contained much of practical interest to the foundryman as was shown by the full discussion which followed each paper. Robert E. Kinkead, Lincoln Electric Co., Cleveland, explained the progress and application of electric welding to the work of steel, malleable and gray iron foundries. He stated that malleable is being successfully welded with the electric arc, as is also cast iron, but with the explanation that the welding work on these materials is to correct surface defects rather than to unite or strengthen breaks which under stress might cause the casting to fail. In the discussion it was made plain that welding defects with mild steel rods in gray-iron castings causes a limited chilled area, on one side of which line or area of fusion is a comparatively high carbon steel and on the other gray iron. For this reason if the area of fusion is brought under stress, failure will result through the two materials separating, the steel pulling out from the gray iron. The author contended that no flux is necessary in electric arc welding, as the heat generated is so great that fusion results without difficulty. In the discussion this was questioned by Prof. Alfred S. Kinsey, Stevens Institute of Technology, Hoboken, N. J., who stated that the purpose of the flux is to remove oxides.

Professor Kinsey followed with a discussion of his paper, "A New Cutting Gas," in which he described the physical properties, operation and economical qualities of a gas for use with oxygen in welding and cutting. At the suggestion of J. P. Pero, Missouri Malleable Iron Co., East St. Louis, Ill., the author volunteered to conduct experiments with the new gas to determine its value in removing scabs on malleable castings which at present cause castings to be scrapped owing to this defect. In presenting the theory of cutting with the torch, Professor Kinsey pointed out that the heat depends upon the rate of combustion, and that the cutting is in effect a burning of iron particles in the path of the flame.

George B. Malone's paper on welding castings of different metals and different sections was read by the chairman, Mr. Bean, and was followed by "Refractory Cements," by W. S. Quigley, Quigley Furnace Specialties Co., New York, read by a representative of the company.

Alfred E. Howell, Phillips & Buttorff Mfg. Co., Nashville, Tenn., presented the report of the resolutions committee expressing the gratitude of the association to the Philadelphia association, its committees and to the American International Shipbuilding Corp. for the courtesies and hospitality extended. This report was unanimously adopted.

One most significant feature of the closing session was a resolution passed on motion of R. A. Bull, Duquesne Steel Foundry Co., Coraopolis, Pa., calling upon Senator Kenyon's committee investigating the steel strike to note the foreign influence in the disturbance. This communication appears in full on another page of this issue.

The plan of holding all sessions of the convention in the morning and closing the exhibition at 5 p. m., except on Tuesday, gave the visiting foundrymen and their guests ample opportunity to participate in the unusually attractive entertainment program provided by the Philadelphia local committee under the direction of Frank Krug, White & Brother, Philadelphia. The outstanding entertainment feature of the week was the ride on the CITY OF CAMDEN, which took a capacity load of 1600 persons up the river as far as the shipyards of William Cramp & Sons Shipbuilding & Engine Co., and then down the river to Hog Island and return. This trip enabled the visitors to see the yards of the New York Shipbuilding Co. and the Pusey & Jones Co., Camden, and the government navy yard at League island. After inspecting the steamship NOBLES and several departments of the great shipyard of the American International Shipbuilding Corp. at Hog Island, the foundrymen and their guests witnessed the launching of the steel cargo ship AFOUNDRIA. This vessel, which is the fifty-seventh launched at this yard, takes its name from the first letters of the name of the foundrymen's association, "A. F. A.," and the word "foundry." The ship was christened by Mrs. A. O. Backert, wife of the president of the association.

During the week many foundrymen visited the large industrial plants in Philadelphia and vicinity, a particularly large number taking advantage of the specially conducted inspection trip to the works of the Westinghouse Electric & Mfg. Co. and Baldwin Locomotive Works. On Wednesday the ladies were taken in automobiles through Fairmount park to Valley Forge, where luncheon was served. On Thursday they were given an opportunity to visit Independence hall, Wanamaker's store, the plant of the Curtis Publishing Co., and other points of interest. Other entertainment features included a theater party at Keith's and a golf tournament at the Whitemarsh Valley Golf club.

Two salient features marked the annual banquet held in the ball room of the Bellevue-Stratford, Oct. 2, as a memorable occasion for those present The first was the spirit of comradeship between the allied nations voiced by Sir Ellis W. Hume-Williams, M. P., official representative of the British government, Dr. Marcel Knecht, professor of literature of the University of Nancy, speaking for the French government, and Hon. James M. Beck, formerly assistant attorney general of the United States. The second was the determination expressed by Mr. Beck, and attested by the enthusiasm of those assembled, to protect American institutions and ideals against the sinister threat of anarchistic attack. President A. O. Backert, who acted as toastmaster, expressed gratitude to the foreign guests who by their presence testified to the excellent feeling existing in the foundry industry throughout the world. Nearly five hundred delegates and guests participated in the banquet and many remained to attend the dance which followed. Maj. R. A. Bull, past president of the association, expressed the thanks of the visitors for the hospitality of Philadelphia, the local foundry organization and its committees who made the great convention such a remarkable success.

Melting Methods and Costs Compared

MORE than ordinary interest was shown in the steel session, held Wednesday morning, Oct. 1, and practically the entire audience remained until the last discussion was finished. The subjects which engaged the attention of the meeting were the relative importance of the sulphur content to the properties of steel, a comparison of the electric furnaces with the open hearth and the converter, both as to cost of melting and quality of product, and a discussion of the different methods of measuring temperatures. R. A. Bull, Duquesne Steel Foundry Co., Pittsburgh, who presided at the meeting, advocated that a committee be appointed to work with the committee of the American Society for Testing Materials in determining the effect of sulphur on steel. These committees will work in co-operation with the bureau of standards in securing data and making tests to find out just what limits of sulphur are detrimental to the quality of steel.

The subject of the effects of sulphur on steel was introduced by Prof. A. E. White, University of Michigan, Ann Arbor, Mich. In his paper which was published in the Oct. 1 issue of THE FOUNDRY, Prof. White says:

To talk about the effect of an increase of 0.01 or 0.02 per cent of sulphur when by improper annealing, improper steelmaking or by improper foundry practice, properties many times worse than those produced by sulphur are acquired by the steel, is, in the writer's judgment, placing undue emphasis on the wrong factor.

Sulphur in steel may increase blow holes—it is granted that this is a disputed point—but assuming that it does, it will not do so to nearly the same extent as an improper temper to the mold; improper venting of the mold or core, especially the core; or an improper pouring temperature. It may increase shrinkage, but it will not do it nearly as much as an improper casting design, an improper pouring temperature, or too rapid a heating or cooling during the annealing. It may decrease the metal's resistance to shock but not to the degree that a poorly designed casting will, or one in which the metal has been overheated, burned or underannealed with the dendritic structure still in evidence.

Considerable discussion followed this paper. Some of the discussion tended to show that the effect of sulphur is not as great as is usually claimed. On the other hand, to prove the serious nature of high sulphur it was stated that fourteen 16-inch gun stands, which broke in service, all contained high sulphur steel, while no stand which had less than 0.04 per cent sulphur broke in service. One of the speakers thought this might have been due to segregation and improper annealing. J. H. Locks, Commonwealth Steel Co., Granite City, Ill., said that a curve plotted from data covering 1600 consecutive heats of basic open-hearth steel which ranged from 0.02 to 0.03 per cent sulphur, was almost a straight line and showed that the percentage of cracked castings was three times as great as when the sulphur was 0.03 per cent. A curve plotted from the phosphorus content was a horizontal line showing that a small variation in phosphorus did not have any effect on the cracking of the steel.

In support of the contention that small variations of sulphur have little effect on steel, J. E. McCauley, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., said that in his personal experience he had been unable to secure proof that 0.06 per cent sulphur is injurious to steel nor had be received any proof to this effect from the foundrymen he has come in contact with in his position

as chairman of the committee on the effect of sulphur on steel of the Steel Founders' Society.

G. R. Hanks, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., read a paper on electric versus converter steel. This paper was prepared by Mr. Hanks in conjunction with John H. Hall, also of the Taylor-Wharton company. The data given showed that castings made from converter steel cracked while the same castings made of electric furnace steel did not crack even though containing as large a percentage of sulphur as the ones which had come from the converter.

Discussion of this paper brought out the fact that while it is possible to determine the temperature of electric furnace steel before pouring it, thus making it certain the metal is never poured too cold, this is not possible with converter steel. Therefore such steel is sometimes poured too cold, which would account for its cracking. Another sidelight on electric furnace steel was presented in a paper on the comparison of costs of electric and open-hearth furnace practice by E. H. Ballard, General Electric Co., West Lynn, Mass. Mr. Ballard gave the costs of operating a 6-ton basic electric furnace and a 20-ton acid open-hearth furnace as follows:

	Dollars per net ton	
	Electric furnace	Open-hearth furnace
Total metal	9.52	14.28
Special metals	1.79	3.52
Expense items	21.58	6.60
Metal cost in ladle..	36.57	32.55

In concluding, he says: "For the special requirements to be met, electric furnace steel is superior to the open-hearth product from a quality viewpoint, and I consider the cost comparable with open-hearth costs and not prohibitive."

F. W. Brooke, Electric Furnace Construction Co., Philadelphia, read an interesting paper covering the present methods of measuring the temperature of molten steel. The methods were divided into two classes —pyrometer and practical shop methods. Of the pyrometer methods, the thermocouple method was said to be impractical because the high temperatures to be measured require an expensive platinum-base thermocouple and there has not been found a satisfactory protection tube for such a couple. The operation of the optical and the radiation pyrometers is handicapped by the smoky atmosphere and hot gases of the furnace. The practical shop methods have so far proved the most satisfactory in the opinion of the speaker. These consist of the film test, the rod test and the pouring test. The film test is made by taking some metal from the furnace on a spoon and measuring the length of time required for a film to form. If the film forms in less than a certain time, which is 60 seconds for the usual run of castings, the metal is too cold, while if a longer time is required the metal is too hot.

To make the rod test, a standard rod is moved forward and backward in the bath for a given length of time and then withdrawn. Its condition after coming from the bath tells the relative temperature of the metal; if metal from the bath sticks to the rod, the temperature is too low, while too high temperature is indicated by the way the bar is eaten away. The pouring test must be conducted by a man who has had considerable experience with it, but it has the advantage of showing just how the metal will run. It is made by taking a spoonful of metal from

Alien Influence in Steel Strike Strongly Denounced

A Communication to the Senate Committee on Labor and Education From the American Foundrymen's Association

THE American Foundrymen's association is holding its annual meeting in Philadelphia. This convention is the greatest in our history of 24 years' advancement of the purely technical and industrial phases of the foundry industry. More than three thousand foundrymen are in attendance. Our exhibit of foundry equipment and supplies occupies the entire space of 90,000 square feet in the Philadelphia Commercial Museum. Unquestionably this meeting of foundry owners, managers, superintendents, chemists, foremen and of manufacturers of equipment required for foundry operation, embraces the most intelligent and broadminded personnel in the basic industry of the casting of metals.

Never in the history of this organization have discussions been permitted in our meetings relating to the unionization of labor, or to advisable rates of wages. We contemplate no change in this policy and will continue to serve our industry in the future along the same scientific lines as has been the custom in the past.

The operations of many industries have been affected by the present strike of steel workers instituted primarily against the United States Steel Corp. We recognize, as your investigating committee does, the tremendous importance of this strike. We believe the very bulwark of our nation is seriously menaced. We respectfully call to the attention of your committee the significant and incontrovertible fact that the vast majority of those who are attempting to paralyze the foundry industry coincident with the attacks upon the steel mills, are of foreign birth, and that whatever success in those endeavors is being achieved in our foundries results in very large degree from intimidation and violence.

You and your committee are charged with a solemn duty. We believe you will not shirk it, but will make your investigation rigorously searching, as to existing conditions of employment, and the present and past activities of the men who organized and are conducting the strike and of those opposed to them, to the end that in all branches of industry connected with the manufacture of iron and steel, those who work in them with their hands and brains may do so under conditions fair to both classes, in lasting security against improper coercion and in conformity with the principles of liberty drafted by our fathers in this city where our membership is now assembled.

This communication is without precedent in our organization. After mature deliberation we believe the circumstances justify it and that the essentially scientific nature of this the greatest organization of foundrymen in the world will give weight to our statements. We beg to inform you that a vast number of our members toiled with their hands for a daily wage in the earlier stages of their foundry careers. Hence our sympathies for the honest working man are genuine.

the furnace and pouring it to see how it flows. The discussion of this paper brought out the fact that it is desirable to make two different tests and not to rely on the result of a single kind of test. Of all the tests, the film test was thought to be the most reliable and to offer the advantage of giving a definite figure which can be recorded, while the results from the rod test and the pouring test can only be described indefinitely.

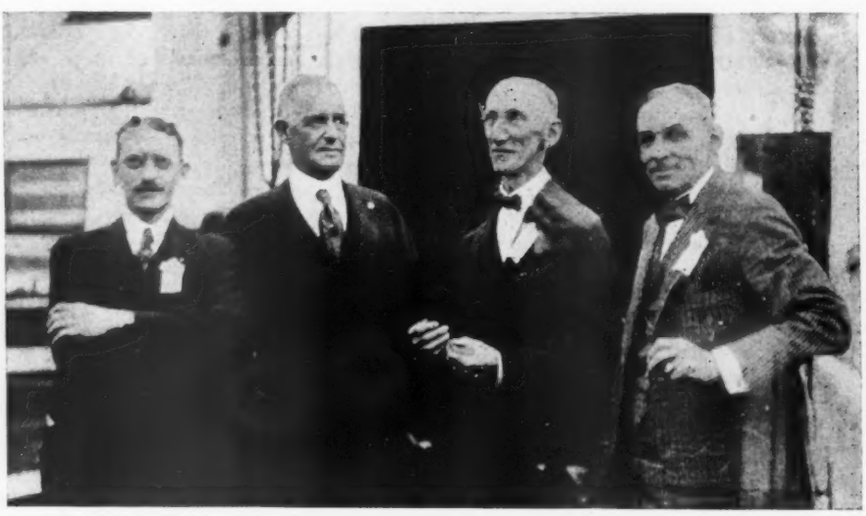
A short report was presented by W. A. Janssen, American Steel Foundries, Chicago, chairman of the committee on steel foundry standards. This included a design of a portable, automatically controlled oil burner. Other papers presented were "Repairin Castings on Transport NORTHERN PACIFIC, by Arthur F. Braid, Metal & Thermit Corp., New York, illustrated by motion pictures, and "The Acid Electric Furnace Process," by L. B. Lindemuth, Carney & Lindemuth, New York.

Malleable Men Discuss Big Problems

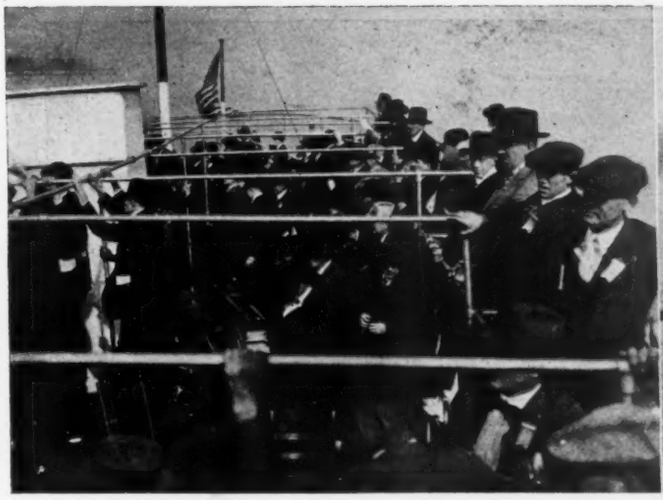
AN interesting and long program of papers was presented at the malleable session Thursday morning, presided over by W. R. Bean, Eastern Malleable Iron Co., Naugatuck, Conn. The first four papers dealt with melting methods. Although the figures in the paper presented by J. P. Pero, Missouri Malleable Iron Co., East St. Louis, Ill., on burning fuel oil in the air furnace, showed that under price conditions obtaining in East St. Louis the melting costs are higher for oil than when coal is used as a fuel, Mr. Pero stated that he favors the use of fuel oil for melting malleable. He has worked with the furnace for some time and has found, he said, that there are advantages in oil melting which cannot be measured in dollars and cents. As an example of how different conditions might make oil fuel cheaper than coal for melting, the case of the Jewell Steel & Malleable Iron Co., San Francisco, was cited. It was stated that this company found that oil with a consumption of 65 to 66 gallons per ton of iron melted in a coal furnace, was cheaper than coal for melting, due to the fact that coal is abnormally high priced on the Pacific coast. During the discussion of melting ratios P. J. Davis, Moline Malleable Iron Co., Fairfield, Iowa, said that one foundry he is familiar with melted with 65.6 gallons of oil to the ton of metal, and the Globe Malleable Co., Syracuse, N. Y., consumed 80 gallons per ton of metal melted. Even with the advantage secured by regeneration, the Fort Pitt Malleable Co., Pittsburgh, has not made a better average than 46 gallons of oil to a ton of metal melted.

The application of powdered coal to the malleable foundry both for melting and annealing was broadly covered in three papers by Charles Longenecker, the Bonnot Co., Pittsburgh; Milton W. Arrowood, Ground Coal Engineering Co., Chicago, and H. A. Grindle, Combustion Economy Corp., Chicago. These papers were published in THE FOUNDRY, Oct. 1. W. H. Firch, Lehigh Pulverizer Co., in discussing these papers, said that powdered coal for melting has been proved beyond doubt to be practical. For four years open-hearth furnaces have been operated to melt steel with powdered coal. Melting ratios of 450 pounds of coal to one ton of melted metal have been secured. Some of the advantages of powdered coal for melting in the air furnace were shown by results obtained in a small air furnace which had been changed to burn powdered coal. Instead of taking 13-ton heats it was possible to melt 18 tons of metal in a heat. The average fuel ratio was 4.5 to 1 when melting with powdered coal. A big saving of refractories was secured, but the furnace has been operating with powdered coal for so short a time that quantative figures were not available. In this installation the powdered coal is pumped 250 feet from the storage bin to the furnace.

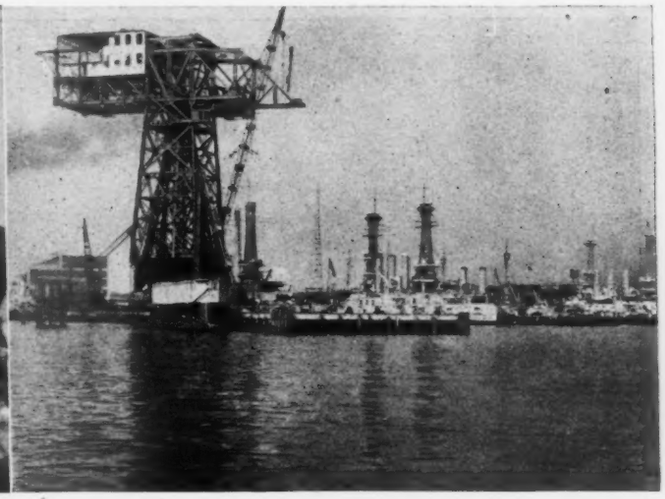
Figures showing results obtained from melting malleable with powdered coal were given by H. A. Grindle, Combustion Economy Corp., Chicago. These figures were obtained from the operation of an air furnace at the National Malleable Castings Co., Chicago. So far 19 heats have been taken off and the metal in every one of them was satisfactory, pouring clean and showing good physical properties. Sulphur was found to run about 0.01 per cent lower than when the metal is melted by hand firing. The second heat taken off Sept. 25 was melted in 4 hours and 25 minutes. It was all out of the furnace in 5 hours and 30 minutes. There were slightly more than eight tons of metal in the heat which was melted with 595 pounds of coal per ton of metal at the rate of 1.48 tons per hour. The composition of the metal tapped was, silicon, 0.92 per cent; sulphur, 0.054 per cent; manganese, 0.28 per cent, and carbon, 2.44 per cent. The coal ratio of 595 pounds per ton of metal compares with 800 to 900 pounds of hand fired coal to a ton of metal melted. Enrique Touceda of the American Malleable Castings association deplored the fact that foundrymen are used to try to secure more rapid annealing, as he does not think that a proper grade of metal can be secured when the anneal is rushed. He said that he did not believe a heat could be thoroughly and satisfactorily annealed if held at temperature for less than 48 hours. If brought up to temperature too quickly the effect would be to expand the ring of the packing boxes faster than the castings inside which would loosen them and allow the packing around the top castings to fall to the lower portions of the stack, causing distorted castings.



EX-PRESIDENTS OF THE FOUNDRYMEN'S ASSOCIATION NEVER BECOME HAS-BEENS—THESE FOUR ACTIVE EX-PRESIDENTS ARE R. A. BULL, J. P. PERO, B. D. FULLER AND ALFRED E. HOWELL



OVER A THOUSAND ENJOYED THE BOAT TRIP ON THE DELAWARE PROVIDED BY THE PHILADELPHIA ASSOCIATION



THE GOVERNMENT NAVY YARD AT LEAGUE ISLAND EXCITED GREAT INTEREST FROM THE VISITORS DURING THE DELAWARE TRIP

It was also brought out in the discussion that powdered coal is being used for drying molds and the following comparative figures were given: Drying with oil required 18 hours, with coal. 12 hours; 300 to 350 gallons of oil were required for drying an oven charge while the same work is done by 2600 pounds of powdered coal. The methods employed in securing these results were very fully discussed.

The report of the committee on specifications for malleable castings was presented by Enrique Touceda, chairman. The committee recommended that the specifications for malleable iron castings recently made standard by the American Society for Testing Materials, be adopted by the American Foundrymen's association. A paper by G. Ernest Wells, Edgar Allen & Co., Sheffield, England, was read by Mr. Bean in the absence of the author. This paper gives information about Great Britain's experimental foundry which was built during the war, and the chairman said it was a subject which should be of interest to the meeting as it showed the possibility of such a foundry in this country.

Education Is Cure For Industrial Ills

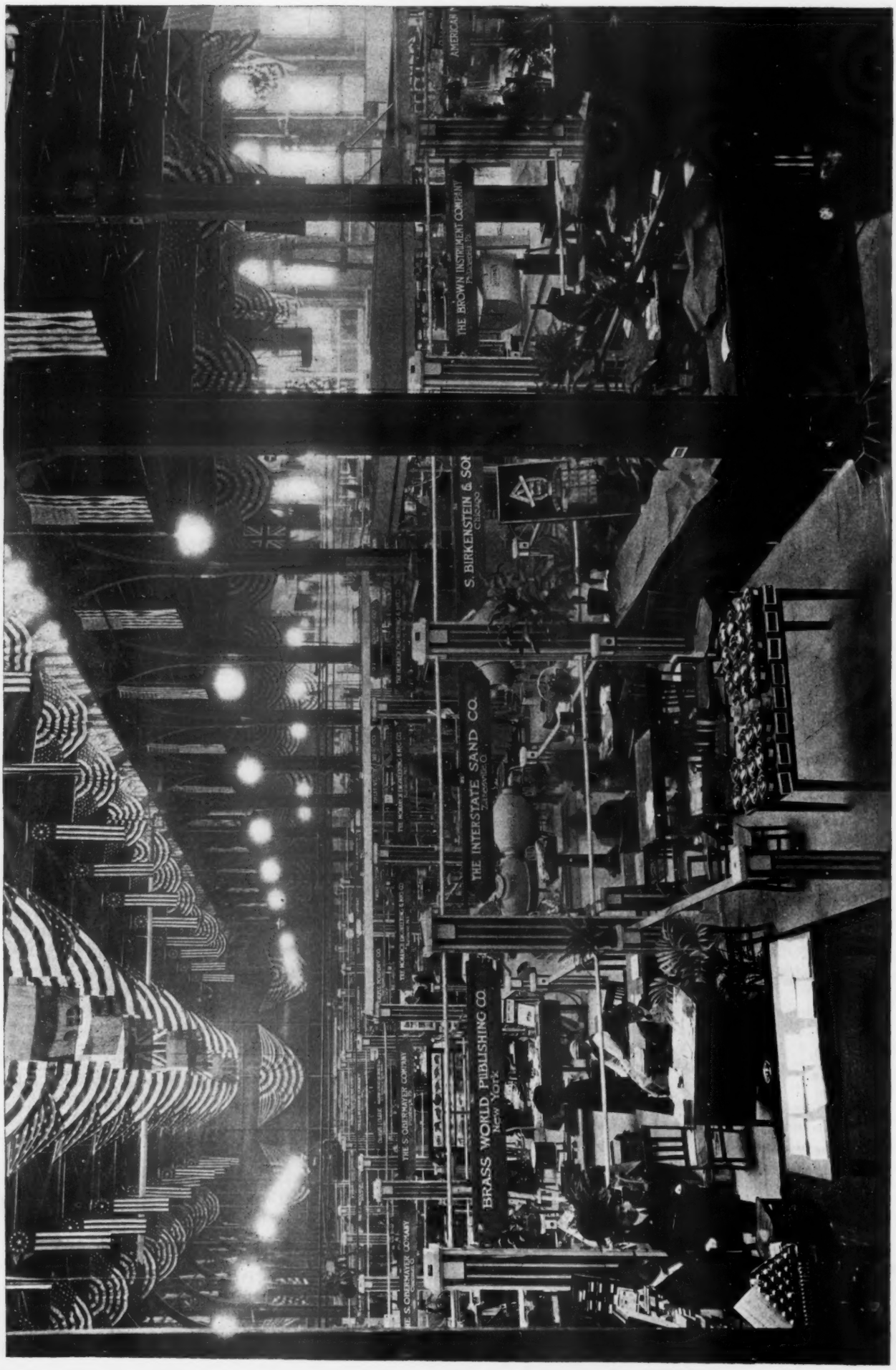
FOR the first time in the history of the association, papers devoted to problems of vocational training, personnel and industrial relations were presented in a special session. In the course of this meeting a number of speakers shed important sidelights on the present industrial situation and suggested improvements which in the aggregate constitute a contribution of constructive criticism which is bound to prove of benefit to foundrymen and plant executives in many branches of industry. C. C. Schoen, United States department of labor, training service, Stamford, Conn., presented a paper on training men for foundry work in which he revealed the results of an investigation of the status of foundry training in 646 foundries. He declared that in these foundries, where 14,462 skilled workmen are employed, only 1096 apprentices, or less than one-third of the 3538 authorized under an agreement with the International Molders union, are employed. The causes of the reluctance of young men to engage in foundry work include low wages, unsanitary conditions, laborious work, monotonous routine, the influence of public schools, the lack of a sound practical or definite training program and the lack of incentives.

C. D. Dyer Jr., Hunt & Dyer, Philadelphia, read a paper entitled "Personnel Problems in Modern Industry," in which he declared that the three most important factors in securing and retaining a proper industrial relationship are the establishment of a definite policy, the proper interpretation of the policy and a practical application of details in connection with the policy. The plan of relationship must provide an opportunity to every member of industry for advancement, financial remuneration and development as a citizen and community member. In interpreting the policy the employer and his representatives must be broadminded enough to assume the leadership in the development of morale.

John Calder, consulting engineer, New York, in a paper, "Industrial Democracy and the Foreman," characterized the foremen as the non-commissioned officers of industry and strongly emphasized his belief that the hope for satisfactory relations lies in the education of these men. He stated that as a rule foremen know little of human nature and care less. "Multiply yourself through your foremen," was the keynote of his urgent appeal to employers. He advocated a course of intensive training designed to teach foremen the fundamentals of economics and to make them more familiar with the intelligent handling of men.

J. C. Wright, federal board for vocational education, Washington, presented a paper on vocational training for foundry occupations. He discussed the value of part time and evening schools and explained the functions of the federal board for vocational education. Boyd Fisher, Aluminum Castings Co., Detroit, referred briefly to a vestibule school inaugurated by the company at its Detroit plant, but which still is in an experimental stage.

C. B. Connelley, the commissioner of labor, state of Pennsylvania, Harrisburg, Pa., who presided at the session, spoke of the desirability of publishing the course for the training of foundry apprentices recommended by the association's committee on that problem and urged that employers launch a campaign to place reliable literature pertaining to industrial matters in the hands of workers, who at present are flooded with propaganda which does not treat such subjects fairly, nor present them aright.



THE SPACIOUS HALL OF THE COMMERCIAL MUSEUM OFFERED EXCEPTIONAL FACILITIES FOR ALL CLASSES OF EXHIBITS

Foundry Exhibition Surpasses All

Greatest Gathering of Materials, Supplies and Equipment Ever Assembled Serves to Mark Progress in the Practical and Mechanical Phases of the Industry

THAT the strain of high pressure production, felt by the manufacturers of the United States while making their unprecedented and successful attempt to meet the demands of war, did not retard to any appreciable extent their desire or ability to create new and better machine shop and foundry equipment was amply demonstrated at the fourteenth annual exhibition of the American Foundrymen's association, held at the Philadelphia Commercial Museum during the convention. Proof that engineers have taken full advantage of the cessation of hostilities to engage in experimental work and to further develop labor-saving machines, was provided in many of the exhibits of molding machines, sand-blasting equipment, and metal and wood-working machinery.

The association was particularly fortunate this year in securing a hall in which all of the exhibits could be assembled in one room. This feature more than compensated for the slight inconvenience involved in reaching the exhibition from the hotel where the meetings were held.

New Molding Machines Exhibited

For the first time in several years, new molding machines figured prominently in the exhibition of foundry equipment. During the period in which the United States was engaged in meeting the demands of war, the manufacturers of molding machines had little time to conduct experimental work and consequently few new machines were developed. With the signing of the armistice, this restraint was removed, and the renewed efforts of engineers to improve the existing equipment are strongly reflected in this year's exhibits. As was the case, especially in the last two foundry shows, it is again apparent that labor saving is the principal motive underlying the design of modern molding equipment. During the war, the rapid exodus of foundry workers to enter military service compelled foundrymen to rely more and more upon mechanical apparatus. Now that the war is over, the expected increase in the supply of labor has not materialized, and the labor saving equipment created under the stress of the terrific demand for war production is needed now as much, if not more, than ever before.

One of the most noteworthy machines displayed by the manufacturers of molding equipment was a device for producing tractor transmission housings in green sand designed and patented by J. T. Stoney, foundry superintendent of the Ferro Foundry & Machine Co., Cleveland. A detailed account of the manner in which this equipment is operated appeared in the Sept. 15 issue of THE FOUNDRY. Other new equipment included a combination split pattern machine displayed by the Mumford Molding Machine Co., a jarring stripping

EVEN THE OPERATING EXHIBITS OF MACHINERY AND EQUIPMENT WERE ARTISTICALLY ARRANGED

plate machine exhibited by the Tabor Mfg. Co., a machine of the jar-ram type shown by the Cleveland-Osborn Mfg. Co., Cleveland; and a jolt-squeezer machine exhibited by the Berkshire Mfg. Co., Cleveland.

Displays Electric Molding Machine

The exhibit of Henry E. Pridmore, Chicago, included seven molding machines ranging in size from a 10 x 12-inch stand machine to a 36 x 48-inch electric jolt-stripping machine. The latter machine, which has a 16-inch draw was equipped for molding a large base casting for a jolting machine and was demonstrated during the exhibition. An electric driven quarter-size model of this machine attracted attention. Among the other molding machines displayed by this company were a 24 x 30-inch plain jolter, electrically driven; a 29 x 24-inch power rock-over machine working on a pipe tee pattern; a 16-inch jolt and stripping machine with 8-inch draw demonstrating on a gear case pattern and a 16 x 14 hand rock-over machine operating on a bevel gear pattern.

An unusually complete line of molding machines was displayed by the Tabor Mfg. Co., Philadelphia. Molds for a large tractor motor crank case were made on a 9-inch jarr roll-over pattern drawing machine. A high platform had been built around this machine so that visiting foundrymen could inspect it as it would appear in actual operation on a foundry floor. Molds for motor frames were made on a new 16-inch jar stripping plate machine which was completed only last week. This machine is of the open end type, has a 4-inch draw and will accommodate flasks up from 16 x 16-inch to 16 x 24 inches. The air is controlled by a new valve embodying an unusually large taper designed to increase the life of the wearing parts. Among the other machines exhibited were a jar squeezing split pattern machine, a 13-inch plain jar machine and hand and power operated machines of various types. One of the split pattern machines was equiped with an electric pattern heater made by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Many Molding Machines Exhibited

The exhibit of the Federal Foundry Supply Co., Cleveland, in addition to the machine invented by Mr. Stoney, previously mentioned, included portable and stationary combination jarr and squeezing machines, plain squeezers, air and electrically operated vibrators, snap flasks, and an agricultural tractor driven by a 2½-horsepower gasoline engine.

The Champion Foundry & Machine Co., Chicago, demonstrated a 16-inch jolt roll-over machine fitted with a pattern and operated as a molding machine and a similar machine fitted with a core box and operated as a coremaking machine. An electrically operated sand riddle also was shown in operation.

One of the most interesting machines at the exhibit was a new jar-ram, squeeze, pattern-draw molding machine demonstrated by the Cleveland-Osborn Mfg. Co., Cleveland. This machine, which was rigged up for making molds for radiator units, handles the cope and drag simultaneously and is mounted on a 4-wheel truck. A detailed description

THE AISLES WERE THRONGED DURING ALL THE TIME THE EXHIBITION WAS OPEN AND OPERATING MACHINERY PROVED EXCEPTIONALLY ATTRACTIVE

of this machine appears elsewhere in this issue.

A new jolt-squeezer type machine in which an internal cylinder performs the jolt and a 12-inch cylinder causes the squeezing was demonstrated by the Berkshire Mfg. Co., Cleveland. This machine accommodates a flask with 8-inch cope and drag 22 inches wide and any practicable length. Air and hand operated squeezing machines, vibrators, snap flasks and pattern equipment were also displayed by this company.

The E. J. Woodison Co., Detroit, had an extensive display of molding machines including a 5-inch jarring machine with 18 x 18-inch table; a 10 x 32-inch and a 16 x 48-inch squeezer; a jar ramming, roll-over core drawing machine; a core box drawing machine; mold jackets, snap flasks and other foundry supplies.

The Mumford Molding Machine Co., Chicago, exhibited a new combination jolt split-pattern molding machine equipped with a automatic slow starting pattern-draft cylinder operated by oil and controlled by a knee valve. The Herman Pneumatic Machine Co., Pittsburgh, displayed a plain jarring machine with the table plate off of the base to show the construction of the machine. A new jolt roll-over machine and a small hand roll-over machine were shown by the Grimes Molding Machine Co., Detroit. The Davenport Machine & Foundry Co., Davenport, Iowa, exhibited a combination jolt roll-over pattern draw machine, a 30 x 30-inch jolt stripper and a jolt squeezer.

The Arcade Mfg. Co., Freeport, Ill., exhibited a plain air operated squeezer, a combined jolt and squeezer, other molding machines of hand and air operated types, four core making machines, and a pouring device. Various types of molding machines also were displayed and operated by the Buch Foundry Equipment Co., York, Pa.; the International Molding Machine Co., Chicago, and the United States Molding Machine Co., Cleveland.

The Foundry Appliance Co., Newark, N. J., demonstrated a cope handling device on a squeezer type molding machine. As the piston moves upward the cope is clamped against the head of the machine by flask hooks. On the down stroke of the piston, the pattern is drawn from the cope and drag. The plate is removed and the mold closed by lowering the cope on the drag. Taper snap molding flasks and automatic snap flasks were demonstrated on a power squeezer machine by the T. B. Wood's Sons Co., Chambersburg, Pa.

Manufacturers of furnaces had a large display of different kinds of melting equipment and a number of firms which did not have exhibits had representatives on hand to explain the design and operation of their furnaces. An assortment of a few of the different styles of their furnaces were shown by the Monarch Engineering & Mfg. Co., Baltimore. Four types of noncrucible furnaces including a double-chamber furnace, a vertical furnace and a continuous revolving furnace were shown beside a tilting coke-fired furnace with crucible, a tilting oil-fired furnace with crucible, a stationary oil or gas-fired steel melting furnace and a ladle heater. A style of coke oven fired with either gas or oil and one heated by coke were exhibited.

The Hausfeld Co., Harrison, O., also had a variety of furnaces on display, including both the crucible and noncrucible type. Their exhibit included

BINDERS AND BLACKING WERE SHOWN AND DEMONSTRATED ON PRACTICAL CORES OF UNUSUAL SIZE AND SHAPES

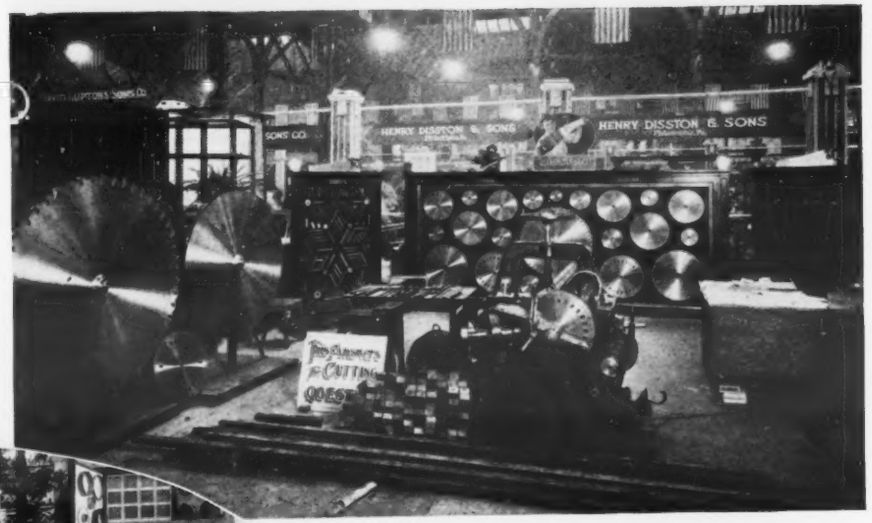
a noncrucible furnace of the tilting type, a tilting crucible furnace, a stationary crucible furnace, an aluminum melting furnace using a cast-iron melting pot, a ladle heater and other foundry equipment for nonferrous metals. Photographs, drawings and data on various types of metallurgical furnaces and foundry ovens were displayed at the booth of Holcroft & Co. This company also furnished data on special electric furnaces.

A 60-kilowatt Ajax-Wyatt electric furnace was among the exhibits of the Ajax Metal Co., Philadelphia. This furnace was not operated at the exhibit but gave visitors opportunity to obtain an idea of its construction. Not only was this furnace shown by the Ajax company but the firm also had a display of yellow brass ingots which were made in the Ajax-Wyatt furnace. These ingots have a depression on each side which allows tongs to grip them firmly. A series of ingots made from different formulas and a variety of castings made from similar ingots were displayed. Among the castings shown were waterback bearings and pump casings for motor-driven fire apparatus, both of which castings have thin wall sections. Illustrations of their furnaces were shown by the Industrial Electric Furnace Co., Chicago, together with views of various applications of the furnaces to different branches of foundry work. A recently developed process of preheating the charge before placing it in the electric furnace was described and details were furnished with regard to the method of handling the charge before it is placed in the electric furnace. The company also described a jolt shakeout machine for separating sand from castings and flasks. A number of other electric furnace manufacturers had booths at which representatives furnished information about their furnaces. The Electric Furnace Co., Alliance, O., presented two moving-picture reels of installations, one of which showed a melting furnace in operation and the other gave views of the actions of the different heating furnaces. Castings made from metal melted in the electric furnace were also exhibited by this company. The Electric Construction Co., Philadelphia, furnished pamphlets describing the Greaves-Etchells electric furnace, and the Pittsburg Furnace Co., Milwaukee, and the Booth-Hall Co., Chicago, were represented by agents who gave detailed descriptions of their furnaces and the operation of them.

Among the burners which attracted attention was the large burner exhibited by the Hauck Mfg. Co., Brooklyn, N. Y. This burner has a nozzle 20 inches long and throws a flame 12 inches in diameter a distance of 20 feet. Such a flame could not be operated at the exhibit but streamers were blown by air and gave a slight idea of the size of the flame. This company also displayed burners for thawing frozen sand, coal or coke from cars or bins. These burners are new and have not been exhibited previously. Oil burning apparatus for lighting cupolas, heating ladles, drying molds and patching cores were also shown. The company also had an exhibit of furnaces for melting metals besides sand dryers, hand kerosene torches, rivet forges, brazing and blacksmith forges, preheaters for welding furnace burners of low and also high pressure types, soldering-iron heating furnaces and salamanders.

The Combustion Economy Corp., Chicago, exhibited a new design of pulverized coal feeding and burning equip-

A great number of alloy metals were artistically displayed, while even the most prosaic shop equipment and foundry materials were arranged to give the best possible effect.



Working models as well as full sized machines served to set forth the merits of equipment, while in some cases small parts were magnified in giant working models.

ment. This was provided with an air-tight rotary air gate, a variable-speed, direct-connected gear case with speeds marked to conform with the operation of the air gate, and a powdered-coal carburetor.

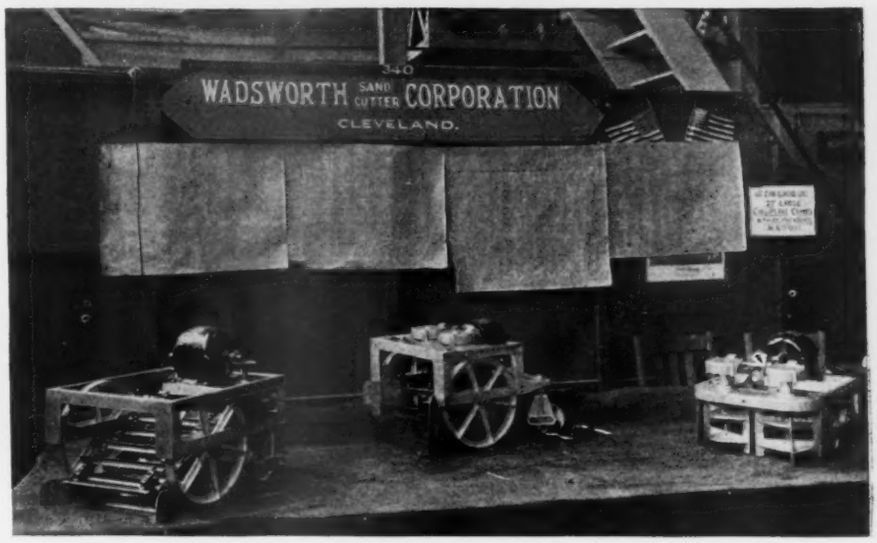
Various sizes of standard crucibles, covers, scorifiers, and phosphorizers were displayed by the Joseph Dixon Crucible Co., Jersey City, N. J. French graphite crucibles were shown by the Foreign Crucible Corp., New York. These crucibles can be made in any of the standard American sizes for brass or steel. The Jonathan Bartley Crucible Co., Trenton, N. J., showed a number of used crucibles with records of a large number of heats melted in them.

Something New in Pyrometers

Leeds & Northrup Co. and the Brown Instrument Co., both of Philadelphia, showed a number of recording and indicating pyrometers. The recently developed heatmeter using the Harrison-Foote method of compensation was shown by the Brown Co. This instrument compensates for any variation of resistance in the line or thermocouple up to 15 ohms, which is ample to take care of any variation ordinarily met with.

A large section of the exhibition space was taken up by the Pangborn Corp., Hagerstown, Md., with a comprehensive display of sand blast equipment. At one end was a 90-inch rotative table cabinet for cleaning large castings. With this machine, the operator stands on the rotary table operated by suction as well as the one operated by air pressure were in operation during the exhibit as were all the other machines in the Pangborn section. The discharge from the different machines was drawn through a separator into a cloth-screen dust arrester and the air after coming through the arrester was discharged into the room, but no dust was noticed coming with it. Beside the working exhibit the company showed lantern slides illustrating sandblast machines.

The J. W. Paxson Co., Philadelphia, had an exhibit of sandblast apparatus including three separators and dust collectors and two kinds of barrels. This company also had installed a 54-inch cupola and displayed many of the other products handled by them, including foundry facings, sands, gravels and clays. The W. W. Sly Mfg. Co., Cleveland, showed a sandblast mill and a turntable cabinet complete with sand and dust elevating and separating system. Several other machines were shown including a sandblast cage, a tumbling mill, and a sandblast pressure tank.



SMALL MODELS EXECUTED WITH PRECISION OF DETAIL OFTEN SERVED TO DEMONSTRATE WORKING PRINCIPLES AS WELL AS COULD HAVE BEEN DONE WITH FULL SIZE MACHINES

Photographs of the company's different apparatus were displayed to give the visitors a clearer idea of the construction and method of operation of the various machines. Their latest type of cloth-screen dust arrester was shown by the Mott Sand Blast Co., New York. This was shown in operation with a sand blast barrel. A complete line of accessories such as helmets, hose nozzles, gloves, etc., was in the booth of the company. The McLeod Co., Cincinnati, had on exhibit, two sand blast barrels, sand blast hose machine and a portable oil burner. A 32-inch diameter, revolving barrel sand blast machine and a 66-inch diameter sand blast table were in operation at the exhibit of the Hoevel Mfg. Corp., Jersey City, N. J. These are the same style machines which have been in operation in New England for seven years.

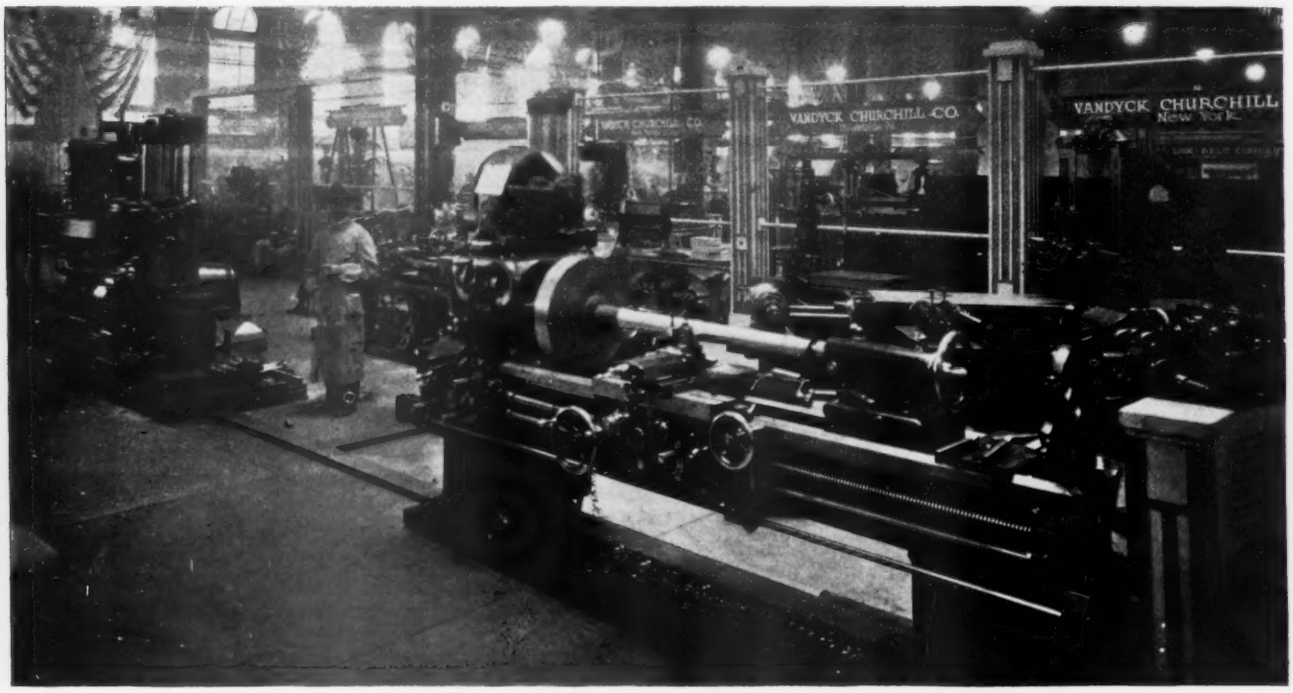
The American Foundry Equipment Co., New York, exhibited an auto sand cutter, designed to cut, mix and pile sand on the molding floor, a rotary table sand blast room, a gravity feed sand blast barrel, an annealing oven truck, and three sizes of core making machines.

A BLAST FURNACE WITH ALL APPURTENANCES WAS REPRODUCED IN MINIATURE TO SHOW THE FOUNDRYMEN HOW THEIR PRINCIPAL RAW MATERIAL IS MADE

Old Firm Still Prominent

Wm. Sellers & Co., one of Philadelphia's oldest manufacturers, exhibited two tool grinders, a drill grinding machine and a sand mixer, all operated by direct current. This company also had a sand mixer arranged for alternating current. This arrangement gives a variable speed such as cannot usually

outside of the sandblast room and avoids the dust while cleaning castings. A 20-inch revolving table for taking care of smaller castings was in operation. Cabinet sandblast apparatus and an abrasive separator for cleaning sand or other abrasives were shown. A



MACHINE TOOLS WERE IN OPERATION IN A NUMBER OF BOOTHS ON ACTUAL WORK

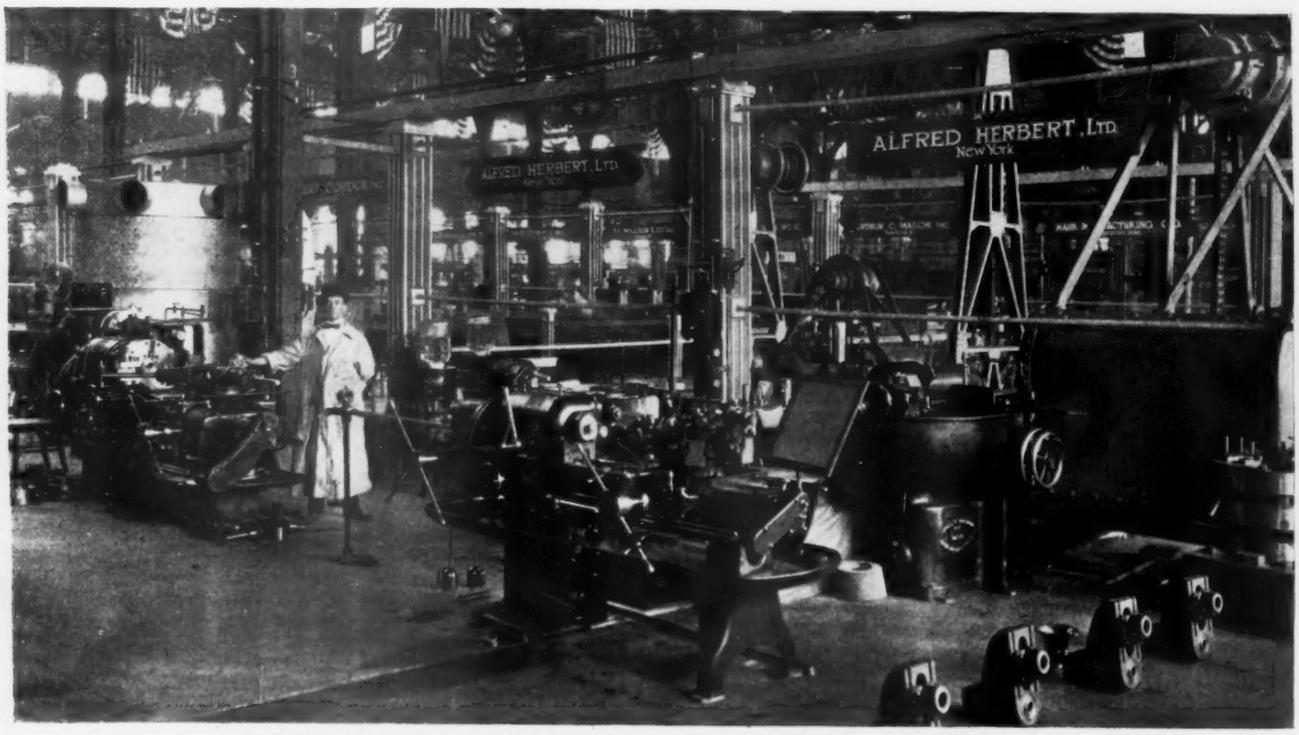
be obtained direct from an alternating current motor.

The Link Belt Co., Philadelphia, had on display a silent chain drive demonstrating its product and also an electric hoist of one-ton capacity which was in operation. The company also exhibited a conveyor belt idler and a Rapp sand revivifier.

Working models of tractor, crane and screen types of the new sand cutting machines built by Wadsworth & Co., Cleveland, were shown. A most complete display of sand mixing machinery of the Simpson muller type, varying from three to six feet in diameter were exhibited by the National Engineering Co., Chicago. The six-foot machine was operating during the show.

An electric operated sand sifter and a gas unit for cutting iron and steel by the use of artificial or natural gas was shown by the Vibrating Machinery Co., Chicago. A motor driven sand mixer was shown in the booth of the Standard Sand & Machine Co., Cleveland. Exhibitors of different classes of molding sand were: Charles E. Pettinos, New York, and George J. Pettinos, Philadelphia. Sand for sand blasting was demonstrated by the United States Silica Co., Chicago, and the Portage Silica Sand Co., Youngstown, O.

Brass tumbling mills, power and hand sprue cutters, core ovens, both gas and coke fired and brass furnaces for both coke and coal chaarcterized the most complete exhibit of the S. Obermayer Co., Chicago. Cherry and



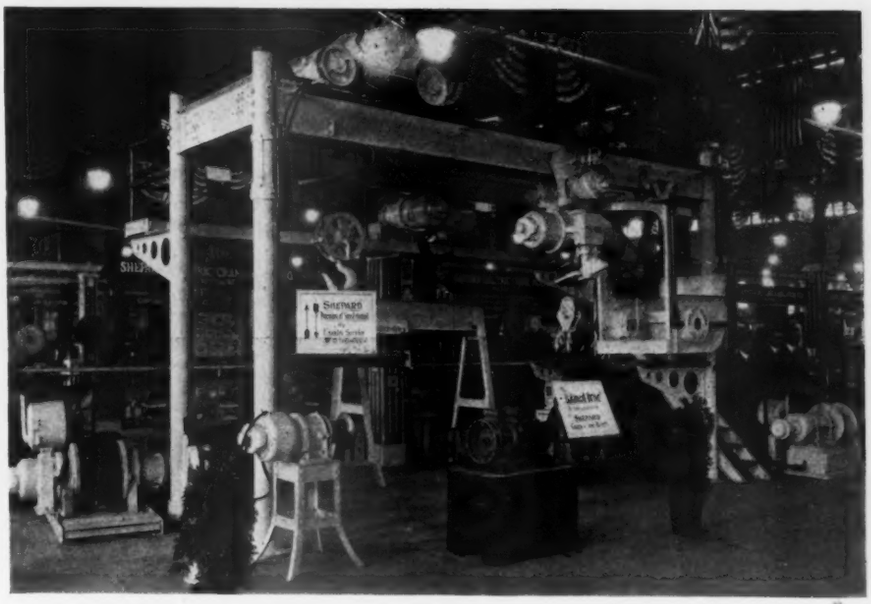
THIS WAS THE FIRST SHOW IN WHICH FOREIGN TOOL MANUFACTURERS EXHIBITED PRODUCTS

oak snap flasks with iron jackets also were exhibited by this firm.

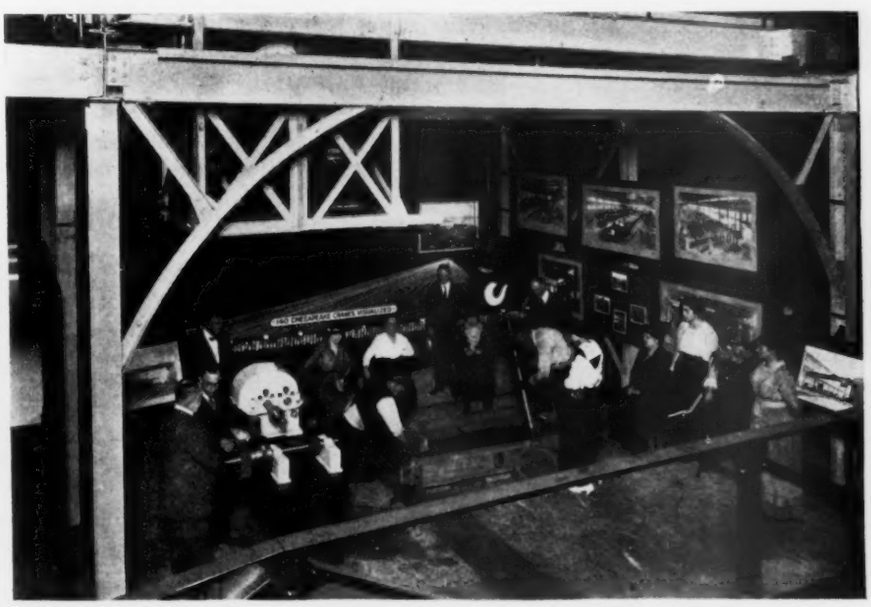
David McLain's booth contained a great number of light castings including automobile parts made from semisteel. These contained from 20 to 50 per cent steel. Open-hearth castings poured from metal made in the McLain-Carter type oil-fired furnaces also were shown.

In times past any sort of structure has been deemed entirely suitable for a foundry, but the handicap of poorly designed buildings and equipment is now generally recognized. This change of viewpoint, marking as it does the passing of another phase of hit-or-miss manufacturing methods, is emphasized by the growing class of construction engineers who design buildings for exclusive foundry purposes. The Philadelphia show was featured by a number of interesting exhibits by this class of experts. Frank D. Chase, Inc., Chicago, showed a large number of photographs accompanied by descriptive matter covering foundry construction of a modern character. The Clement A. Hardy Co., Chicago, presented some exceedingly interesting photographs of foundries constructed or now being built in various parts of the country. The Austin Co., Cleveland, had a number of models, drawings and photographs accompanied by literature covering the class of service which this concern has given and offers in the special field of foundry erection. The H. M. Lane Co., Detroit, also offered examples of this class of industrial plant construction.

Construction problems immediately suggest a thousand details of arrangement and handling facilities, without which the most perfectly designed plant would be inefficient. Handling materials in casting plants is a specialized field and as such is recognized by a number of representative manufacturers who build to meet the needs of the times. Obviously it was impracticable to show full size cranes with craneways proportionate to modern foundry needs, but the crane and hoist manufacturers utilized novel expedients to exhibit their products to the best advantage. The Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., showed a special abbreviated structure upon which was mounted a standard crane trolley operated by controllers placed on the floor nearby. The same frame served to support a cage-operated hoist with electric magnet, two standard types of floor operated hoists, and a new type of electric cargo winch. The latter consists of a cast base upon which is mounted a back-geared motor with a special drum and winch head. The head is arranged so that a load may be held stationary while the boom is raised, lowered or swung around independently by motor power.



EVERY EXHIBIT WAS MARKED BY THE FINISHED CHARACTER OF THE APPARATUS DISPLAYED—SPECIAL FRAMEWORK SERVED IN MANY CASES TO SHOW SEVERAL TYPES OF EQUIPMENT



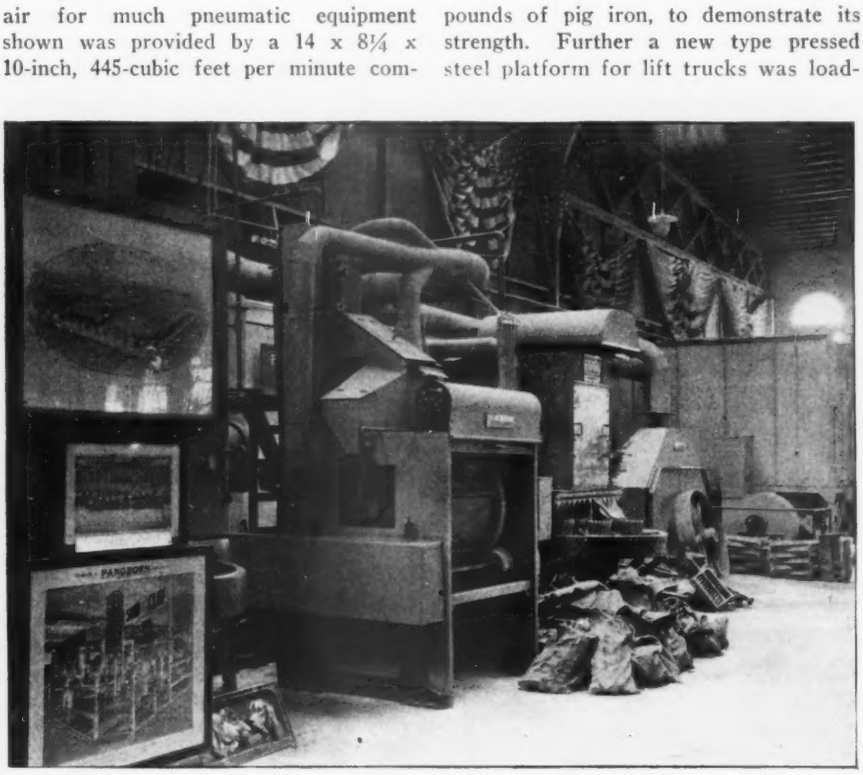
ONE MANUFACTURER SET UP HIS ELABORATE DISPLAY ON DRESS REHEARSAL AT HIS OWN PLANT BEFORE SHIPPING IT TO PHILADELPHIA FOR ASSEMBLY

The Chesapeake Iron Works, Baltimore, Md., exhibited a section of a full sized craneway supported upon an exceptionally well built steel frame which demonstrates the character of other steel structures which this company constructs. Photographs served to set forth the variety of this latter class of work. The Whiting Foundry Equipment Co., Harvey, Ill., featured an operating model of a crane trolley in addition to a diversified list of foundry equipment which included a round steel plate tumbling barrel, a 2-ton charging car, a 2-ton worm geared crane ladle and photographs and drawings of the application of machinery which is in successful use. Other manufacturers of electric hoisting and conveying equipment who had operating models and photographs illustrating their products included the Victor R. Browning & Co., Cleveland; the Louden Machinery Co., Fairfield, Iowa, and the Richards-Wilcox Mfg. Co., Aurora, Ill.

The pneumatic hoist manufacturers were liberally represented. The Chicago Pneumatic Tool Co., Chicago, exhibited pneumatic geared and cylinder hoists in addition to its line of chipping and riveting hammers, drills, grinders, rammers, and a 14 x 9 x 14-inch air compressor. The Ingersoll-Rand Co., New York, had on exhibition motor hoists, grinders, rammers, and chipping and riveting hammers. The Curtis Pneumatic Machinery Co., St. Louis, had in opera-

tion an overhead pneumatic crane with an air hoist, an electrically driven air-compressor, a bracketed jib crane and an I-beam trolley crane.

The Cleveland Pneumatic Tool Co., Cleveland, George Oldham & Sons Co., Frankford, Philadelphia, and the Keller Pneumatic Tool Co., Chicago, all had interesting displays of pneumatic tools which have come to be indispensable in the foundry. The Keller company showed an attractive novelty in a model of a large riveting hammer mounted with cut-out sections and moving to indicate the operation of the tool. Compressed air for much pneumatic equipment shown was provided by a 14 x 8¼ x 10-inch, 445-cubic feet per minute compressor manufactured by the Sullivan Machinery Co., Chicago. This was driven by a General Electric 75-horsepower motor.



AN UNUSUAL AMOUNT OF CLEANING ROOM EQUIPMENT WAS DISPLAYED ON THE FLOOR WITH THE DIFFERENT MACHINES IN FULL OPERATION AS IN A SHOP

Comfort was a minor consideration, often entirely ignored in the old-time foundry. Molders were expected to be warm only when pouring off and daylight was admitted sparingly and mixed with the wintry blasts through haphazard windows. Times have changed. Foundry heating units are much in evidence, and manufacturers have successfully divorced light from cold by providing steel frame sashes which can withstand the rigors of foundry usage. Robert Gordon, Inc., Chicago, showed a mechanical hot-blast heater provided with a sectional case which through numerous sliding doors permitted an inspection of the interior. Skinner Brothers Mfg. Co., St. Louis, showed a heater in which a motor driven fan sucks air through an outside intake and blows it through heating coils and out into the foundry through pipes.

Steel sash for foundry windows was shown by David Lupton's Sons Co., Philadelphia. This company had samples of pivoted sash, and different designs for monitor, saw-tooth roofs and side walls. An interesting feature of this exhibit was a series of charts, displayed and changed automatically, which gave sections and elevations of typical foundries. The Truscon Steel Co., Youngstown, O., had a full sized model of its cash construction, and in addition showed a line of steel flasks. A section of one of these was under a load of 1200 pounds of pig iron, to demonstrate its strength. Further a new type pressed steel platform for lift trucks was loaded to five tons as a test of its stamina.

The Sterling Wheelbarrow Co. featured its exhibit of metal flasks and wheelbarrows by some especially large special forms of flasks with intricate bars.

Let Lightning Do It

The displacement of human labor was typified in the various displays of foundry hauling units. The Mercury Mfg. Co., Chicago, showed a 3-wheel and a 4-wheel unit of its storage battery type tractor and two Bateman trailers. The tractors gave practical demonstrations during the erection of the various exhibits by hauling the heavy machinery into place about the floor of the exhibition hall. The Liberty Steel Products Co., New York, had two types of gasoline-driven industrial tractors and two lift trucks on exhibition, while the Cleveland Tractor Co., Cleveland, had one of the crawl type gasoline motor units in its booth during the exhibition.

Producers of foundry raw materials were plentifully represented. A most attractive miniature model of a blast furnace, with four stoves, together with all the tracks, bins, a skip hoist, ladles, mixer, pig beds and pig machine served to acquaint foundrymen with the way in which their principal working material is produced. This was displayed by the Thomas Iron Co., Hokendauqua, Pa. The Semet-Solvay Co., Syracuse, N. Y., with Pickands, Brown & Co., Chicago, constructed a model of Independence hall, using coke for the building material. Rogers, Brown & Co., Cincinnati, showed samples of coke, alloys, pig iron and fluorspar together with finished castings. The 12-cylinder Liberty motor which was constructed as a permanent exhibit at the Smithsonian institute, Washington, was also displayed by this company. Other exhibitors of foundry raw materials were the Providence Gas Co., Providence, R. I.; the Graceton Coke Co., Graceton, Pa.; Foundry Manganese Co., Philadelphia; Debevoise-Anderson Co., New York, and W. J. Rainey, Philadelphia.

Manufacturers of miscellaneous foundry supplies were more in evidence at this than at any previous show. Core compounds and the work produced by their use were shown by the American Gum Products Co., New York; Corn Products Refining Co., New York; the Robeson Process Co., New York; Werner G. Smith Co., Cleveland; the Barrett Co., Chicago; Swan & Finch, New York; American Oil & Supply Co., Newark, N. Y.; the Mifflin Chemical Corp., Philadelphia, and Spencer Kellog & Sons, Inc., Buffalo.

Welding and cutting apparatus has shown great advance during the past year under stress of reconstruction demand. An oxyacetylene installation for cutting stock up to 12 inches thick and oxyhydrogen apparatus for cutting even 36 inches of metal were shown by the Davis-Bournonville Co., Jersey City, N. J., and other prominent exhibitors of this class of equipment included the Air Reduction Sales Co., New York; Alexander Milburn, Baltimore, and the Oxweld Acetylene Co., Newark, N. J. Electric welding and cutting apparatus was shown by the General Electric Co., Schenectady, Westinghouse Electric & Mfg. Co., East Pittsburgh, and the Lincoln Electric Co., Cleveland.

Wood block floor which has found favor in the past few years for casting plants was demonstrated by the Republic Creosoting Co., Indianapolis, and Jennison-Wright Co., Toledo, O.

Two new exhibitors who are destined to become better known to foundrymen were the Klaxon Co., with its code calling devices for locating men

(*Concluded on page* 749)

System is a Factor in Production

Standardizing and Classifying Flasks and Adopting a Plan Based Upon the Requirement of the Work Are Essential in Increasing the Output—How Hoisting Apparatus Aids the Foundry Industry

BY W. C. BRIGGS

LABOR costs are fast becoming a big problem with all foundrymen. They exist from the time the raw materials arrive until the finished castings are loaded. In order to reduce the number of common laborers to a minimum, designers give entirely too much consideration to the handling of raw materials, loading of castings, etc., where the total pro rata cost per ton is a much smaller factor than the skilled workman's time on the molding floor.

This, of course, is not true in all cases, but is apt to be true in the case of the jobbing foundry where the owner or engineer has in most cases failed to find a means for making a layout of the foundry with foundry floors, cranes, hoists and molding machines so combined that they are adapted to handle to the greatest advantage a predetermined class of work coming into the shop.

A paper presented at the annual meeting of the American Foundrymen's association, Philadelphia, Sept. 29-Oct. 3. The author, W. C. Briggs, is associated with the Shepard Crane & Hoist Co., New York.

If, however, each pattern when it is received is placed in a definite classification as outlined in the accompanying table it will be possible to use hand molding and hand lift where it can be used with the highest efficiency, and hand molding and crane equipment where it will be more efficient, and likewise machine molding and hand lift where these factors can be combined to produce the largest tonnage.

Tag Patterns According to Classification

The writer has not intended to carry this classification into all the sizes of flasks or depths of cope and drag that some foundries no doubt find it advisable to classify, but sufficient to outline the general scheme. The plan proposed is to place this classification list in the hands of the patternmaker or the man who has charge of the flasks so that suitable tags or stencilled markings may be applied to the pattern.

Tonnage of castings is influenced largely by the ratio between the size of the flask and the weight of the casting and the cost of molding follows in much the same ratio. Therefore with a system of this kind, the matter of setting the price is simplified. For instance, if a casting weighing 50 pounds is produced in classification No. 1, the same casting produced in class No. 2 would cost more, and by keeping the cost of castings made by each classification, a table soon could be prepared that would be of great assistance in estimating the cost of making all kinds of castings.

Of course there are many other elements that enter into the cost, but most of these elements do not influence the price anything like the ratio between the size of flask, which governs the amount of labor to a large extent. It is realized that green sand and dry sand molding costs vary, and that the kind and size of cores are important elements.

These classifications also will help to solve the cost problem which has been found so difficult in foundries

FIG. 1—THE WORK NOW HANDLED BY THIS CRANE FORMERLY WAS HANDLED BY A JIB CRANE—PRODUCTION WAS INCREASED 4 TIMES BY THE USE OF THE CRANE SHOWN

Classifying Patterns by Means of Stencilled Markings

Class	Size of Flask	Hand Molding		Machine Molding	
		Hand Lift	Crane Lift	Hand Lift	Crane Lift
1	18 x 18 x 6	1—HMHL	1—HMCL	1—MMHL	1—MMCL
2	18 x 18 x 12	2—HMHL	2—HMCL	2—MMHL	2—MMCL
3	24 x 24 x 6	3—HMHL	3—HMCL	3—MMHL	3—MMCL
4	24 x 24 x 12	4—HMHL	4—HMCL	4—MMHL	4—MMCL
5	24 x 30 x 6	5—HMHL	5—HMCL	5—MMHL	5—MMCL
6	24 x 30 x 12	6—HMHL	6—HMCL	6—MMHL	6—MMCL
7	36 x 36 x 6	7—HMHL	7—HMCL	7—MMHL	7—MMCL
8	36 x 48 x 8	8—HMHL	8—HMCL	8—MMHL	8—MMCL
9	36 x 48 x 12	9—HMHL	9—HMCL	9—MMHL	9—MMCL
10	48 x 48 x 8	10—HMHL	10—HMCL	10—MMHL	10—MMCL
11	48 x 48 x 12	11—HMHL	11—HMCL	11—MMHL	11—MMCL
12	48 x 60 x 12	12—HMHL	12—HMCL	12—MMHL	12—MMCL
13	60 x 60 x 12	13—HMHL	13—HMCL	13—MMHL	13—MMCL
14	60 x 72 x 12	14—HMHL	14—HMCL	14—MMHL	14—MMCL

turning out a large variety of work. It is a well known fact that there is a limited amount of foot pounds of work for every man. It varies somewhat with the man, but just as sure as a man's energies are properly applied, just as sure will he produce more and better results. If it is necessary for a molder to go to the pattern loft or flask shop to get his pattern and then to select or fit up a flask or assist the patternmaker or flask man to do so, and then get his floor ready, cut up his sand, find the necessary rigging, gaggers, etc., he is not going to get started to make his job with as much dispatch as he would if a system was used whereby these factors were taken care of in a systematic way. There may be some work that can be rammed by hand or by treading in with the feet at as low a cost as can be done by any other method, but such jobs are few and far between and a good skilled mechanic should never be used for that kind of work.

Many factors contribute to securing the best results. The old foundry with its low roof and dark interior, where it is necessary to use the tallow candle to see to finish the mold and set the cores, is fast disappearing because it cannot be operated in competition with modern properly lighted foundries equipped with good handling facilities.

As many modern foundries are designed light is the main consideration. Those that make a large variety of work from castings weighing a few pounds to those weighing several tons frequently do not have facilities for handling the kind of work they are to make. Often no attempt has been made to establish even approximately the floor area required or handling facilities best adapted for the particular kind of work to be made because the designer did not have a clear conception of the size and weight and volume of each kind of casting to be made. If, however, the pattern is classified when received or made, into the size of flask which automatically establishes the approximate volume of sand and weights to be handled, the problem of designing the building, distributing the work, providing molding machine and crane equipment can readily be solved.

In the past the handling apparatus, whether overhead traveler, jib crane or monorail hoist has been considered as a necessary evil or an auxiliary equipment instead of being considered as a great aid in producing maximum results providing the handling equipment is selected to serve the particular operations required.

The work shown in the foundry, Fig. 1, was formerly made under a jib crane. Three men had to put in a long hard day to produce nine or 10 molds. This job was fitted up to be made on a molding machine and an electric traveler arranged with controllers operated by pendant cords designed so that any one of the men in the gang could handle the flask to the molding machine and mold to the floor was provided. After one man had placed the cores, another could operate the traveler and close the mold, two additional men were added to the gang making five men to serve the molding machine, set the

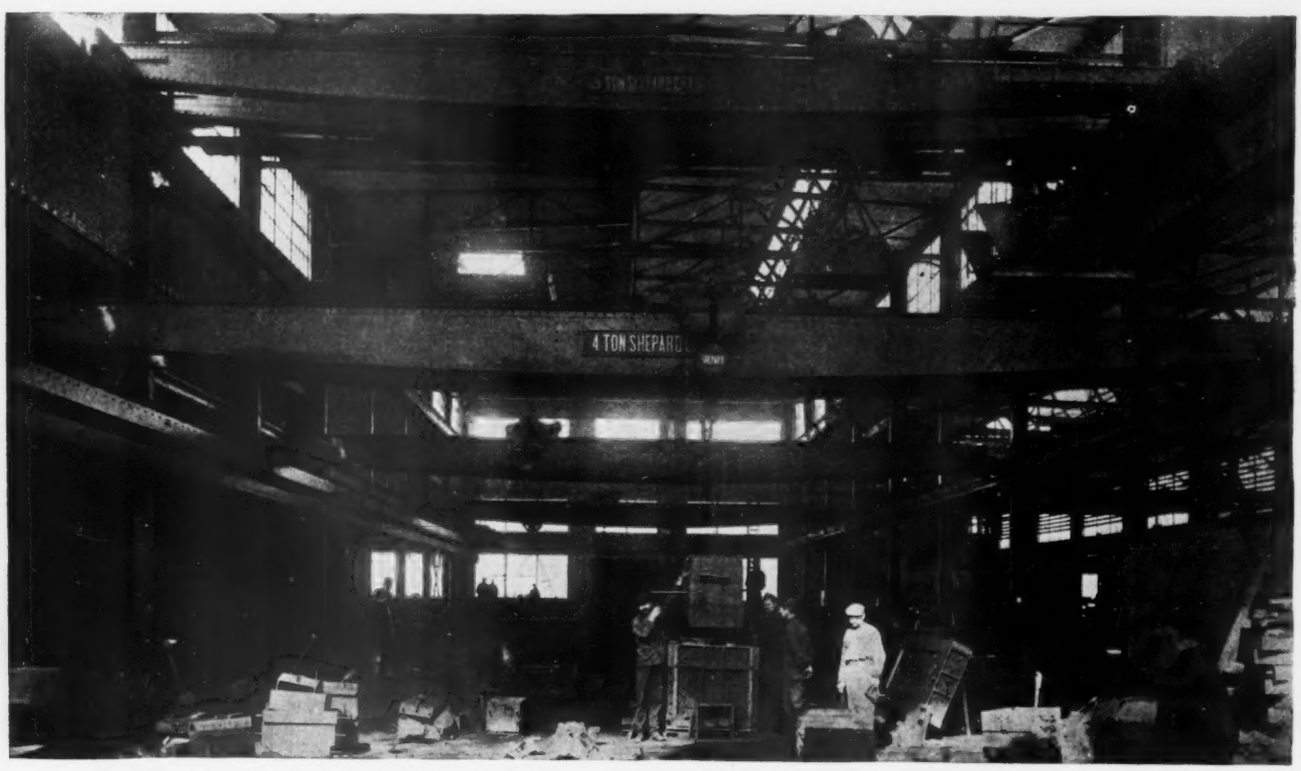


FIG. 2—CENTRAL BAY OF FOUNDRY SERVED BY CRANES ON HIGH AND LOW RUNWAYS—THE THREE CRANES OPERATING ON THE LOWER LEVEL ARE USED IN CONNECTION WITH MOLDING

cores and close the mold. The men produced 44 molds for a day's work and did not work as hard as with the old combination, producing less than one quarter of the number of castings.

Fig. 2 shows a foundry with a central bay served by travelers placed on two levels. On the lower level are three 3-motor electric cranes, arranged for control by pendant cords from the floor, each crane having a capacity suitable for handling the largest mold to be made, but not largely in excess of the capacity required. On the higher level the cage-operated machine is of higher speed and is used largely for distributing

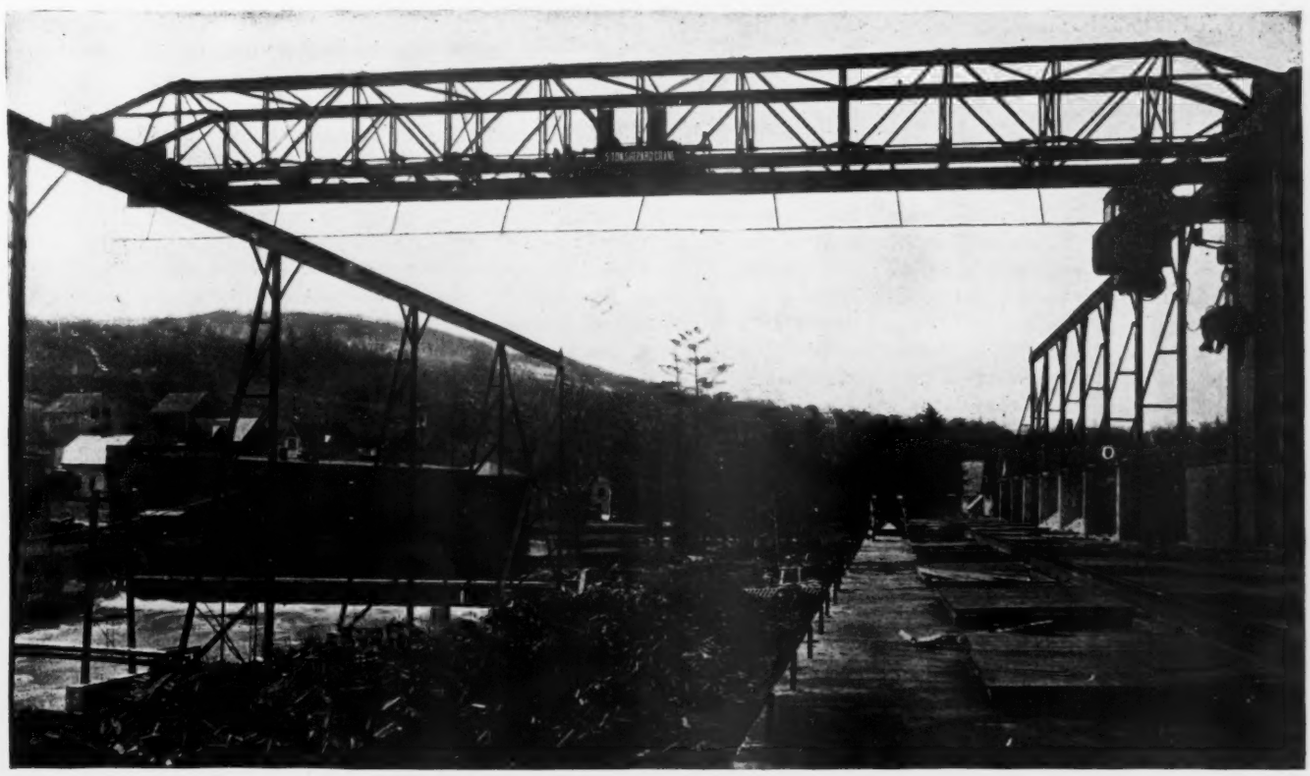


FIG. 3—MATERIAL STORAGE YARD OF FOUNDRY WHOSE INTERIOR IS SHOWN IN FIG. 2—MATERIALS ARE HANDLED BY THE CRANE AND MONORAIL HOIST SHOWN

flasks, taking out castings, and when necessary, carrying large ladles of iron over the top of the lower cranes without interfering with the molding operations. The side floor of this foundry is equipped with two 2-motor electric travelers, arranged for control by pendant cords. These machines are of light capacity, designed to perform the particular operations required of them. The core room, extending the whole length of one side of the foundry is served by a light capacity quick-acting overhead traveler.

The crane equipment in this foundry is nearly ideal, but by applying the system of classification of pattern and by making a study of the average number of castings made in definitely established flasks and by selecting the best molding machines for the work, a much larger tonnage could be produced with the same number of men. While the item of handling materials is low per ton of castings produced, many foundries are operating with high costs that can be lowered economically by the application of properly selected handling equipment.

Fig. 3 shows a material storage yard of the foundry shown in Fig. 2. Pig iron, coke, sand, etc., are moved mechanically throughout. Pig iron is unloaded from the cars by magnet to the yard and as required delivered to the charging platform by the crane and monorail hoist, clearly shown in the illustration. The only man labor is used in charging the cupola from the scales located on the platform. The sand and coke is unloaded by gravity to bins beneath the trestle.

Efficiency engineers have done much to lighten the burden of the manufacturer and the man who does the work but it is no easy task to get these parties thinking along the same lines. Many foundries, especially the jobbing foundries, can greatly increase their production and make the job easier for both owner and workmen by giving more careful study to the pattern before it goes to the foundry and by standardizing flasks and then allotting as far as possible, definite floor space, suitable handling facilities and molding machines for

Former Students Honor David McLain

A number of friends and admirers, comprising students past and present, of David McLain, the originator of McLain's System, Inc., Milwaukee, tendered him a complimentary dinner at the Adelphia hotel, Philadelphia, on Wednesday evening, Oct. 1. The meeting was presided over by C. B. Connelley, acting commissioner of labor for the state of Pennsylvania and eulogistic addresses concerning Mr. McLain and his work were delivered by A. O. Backert, president of the American Foundrymen's association, and W. A. Janssen, vice president. Preliminary steps were taken toward the formation of a society to be composed entirely of McLain students, of whom there are at present over 3200 scattered all over the world. Several former students from abroad were at the dinner, including several from Canada and the British isles.

The name of the Gary Foundry & Machine Co., East Gary, Indiana, has been changed to Calumet Foundry & Machine Co., 148th street and Railroad avenue, East Chicago, Indiana. It is the intention of the owners to continue operating the East Gary shop under the title of Plant No. 1 and the East Chicago Pattern Works as Plant No. 2.

Castings for Ship Construction---XII

Relative Merits of the Bedding in and Rolling Over Methods Considered—Special Types of Boxes Necessary if Castings Are to be Poured in Vertical Position

BY BEN SHAW AND JAMES EDGAR

THE type of propeller shaft bracket under consideration in this article gives better opportunities to the designer in devising a support for the shafts, which, while possessing the requisite strength, will also assist materially in reducing casting difficulties in the foundry. In this instance the sweep of the arms, connecting the bosses with the center piece, illustrates an exceedingly good design from the foundryman's point of view. The heavy metal is shaded off gradually and there are no abrupt changes in thickness of section. For this reason the method of casting will make little or no difference. Only ordinary precautions need be taken for contraction for the possibility of a rupture with such a design is almost negligible. But, although the contraction difficulties are considerably lessened, the method of running the casting and bringing off suitable risers must be given special consideration in order to reduce the formation of porous metal at the junction of the arms with the bosses and center piece.

Many foundries are governed by particular methods because they lack suitable tackle for making the job any other way. The practice of bedding in practically all work outside the capacity of their stock of molding boxes prevails with many foundries and is frequently the cause of wasters. Such methods are usually adopted to reduce the cost of production but in the long run they are far from being economical. The method probably would be adopted in this instance by many foundries owing to the depth of drag box required, or possibly through lack of crane capacity to make the required lift. If, however, a flask is available or can be built up from stock with additional parts made to suit it would be preferable to make the mold in such a way as to allow it to be cast with the bosses in a vertical position. When no large drag box is available and it is not considered desirable to make a special box, bedding-in must be resorted to. With a large pattern of this design bedding-in is a long and tedious job. A level bed should be prepared with straight edges set far enough apart to allow the intervening space to accommodate the pattern. The straight edges may be left in the sand until the pattern is bedded in position. The smallest or top part of the pattern can be laid upon the bed and a rough outline made to form a guide in removing surplus sand. The approximate shape of the center piece can be removed and the bed made by using a depth gage from the surface. With this center bed made up and a considerable amount of the floor sand removed the pattern may be lowered into position. Providing battens are secured to the joint of the pattern, as indicated in Fig. 1, the final position will be secured when the battens rest upon the straight edges and the center piece of the pattern rests upon the prepared bed. A special support for the center piece is required to locate it in the proper position. When the battens are removed the joint of the pattern will be flush with the surface bed. With the floor sand well clear of the other parts of the pattern, and access made to the small loose pieces, representing the continuation of the ribs in the center piece, the process of ramming in the special composition facing can proceed. The sand requires to be tucked under and rammed sideways, necessitating very awkward working positions for the molder. Owing to the probability of lifting the pattern while ramming in this way, it is customary to lower weights upon it as soon as sufficient support is given to the pattern to sustain them. When the joint of the pattern is reached it should be compared with

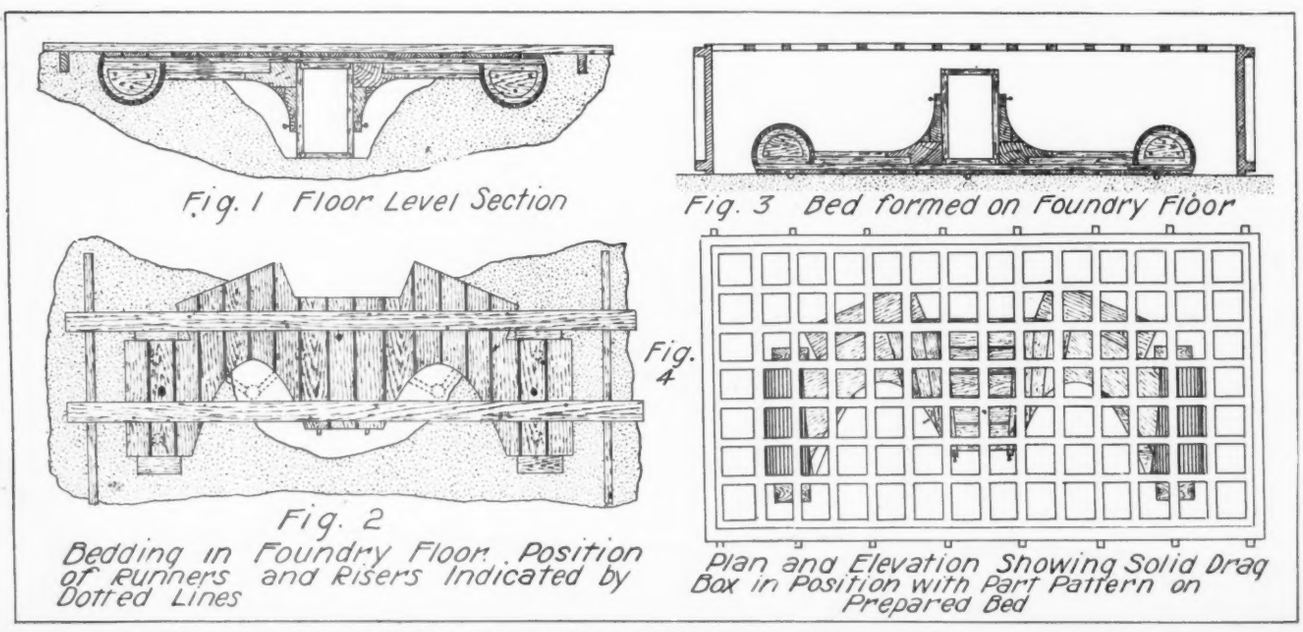


Fig. 1 Floor Level Section
Fig. 3 Bed formed on Foundry Floor
Fig. 2
Bedding in Foundry Floor. Position of Runners and Risers Indicated by Dotted Lines
Fig. 4
Plan and Elevation Showing Solid Drag Box in Position with Part Pattern on Prepared Bed

FIGS. 1 AND 2—TOP AND SIDE VIEW OF PATTERN PARTLY BEDDED IN THE FOUNDRY FLOOR FIGS. 3 AND 4—PLAN AND ELEVATION SHOWING SOLID DRAG BOX IN POSITION—THE DRAG HALF OF THE PATTERN IS RESTING ON A PREPARED SAND BED

the originally prepared bed to make sure that no change in position has been effected. The joint of the mold is similar to the joint of the pattern excepting at the outside of the bosses At these places the sand requires to be cut out to form a short bed from the outside part of the boss and parallel with the main joint, joining the surface with a good taper as shown in Fig. 8.

The straight edges can be removed and the joint made up for the cope box. Molding the bracket, shown in this illustration, in this way offers poor facilities for attaching suitable risers. It can be cast satisfactorily from gates set at the back of the arms in the approximate position shown in Fig. 1, but it is a most

required to give additional support to the sand. They should be secured to the drag box in such a way as to prevent any possible risk of a drop when the box is rolled over. In some instances boxes of this character are provided with a series of holes in the sides to enable the molder to bolt in straight bars just over the pattern. The bars are made deep enough to give rigidity to, and act as supports for any grids it may be found necessary to attach to them. Only a few such bars are necessary; convenient sized grids can be laid along the bars temporarily so that they can be moved to their final position and secured when composition has been applied and a certain amount of ramming done. When the whole box is

drag required it may be necessary to use two sides from stock to get the necessary depth as indicated in Fig. 5. Stocks built up of standard types having slot holes for bolts set at standard centers, similar to some of the more modern foundries, fulfill such requirements. A plan and elevation of a connecting bolt is shown in Fig. 6. The slots may be spaced a fixed distance apart, say 6 inches, and as many bolts used as are necessary to meet requirements. Furthermore, guide pins can be bolted to the joint flanges when both drag and cope boxes are rammed up and before they are separated.

With built up flasks of this character, special sides like the one shown in Fig. 7, for casting work either side-

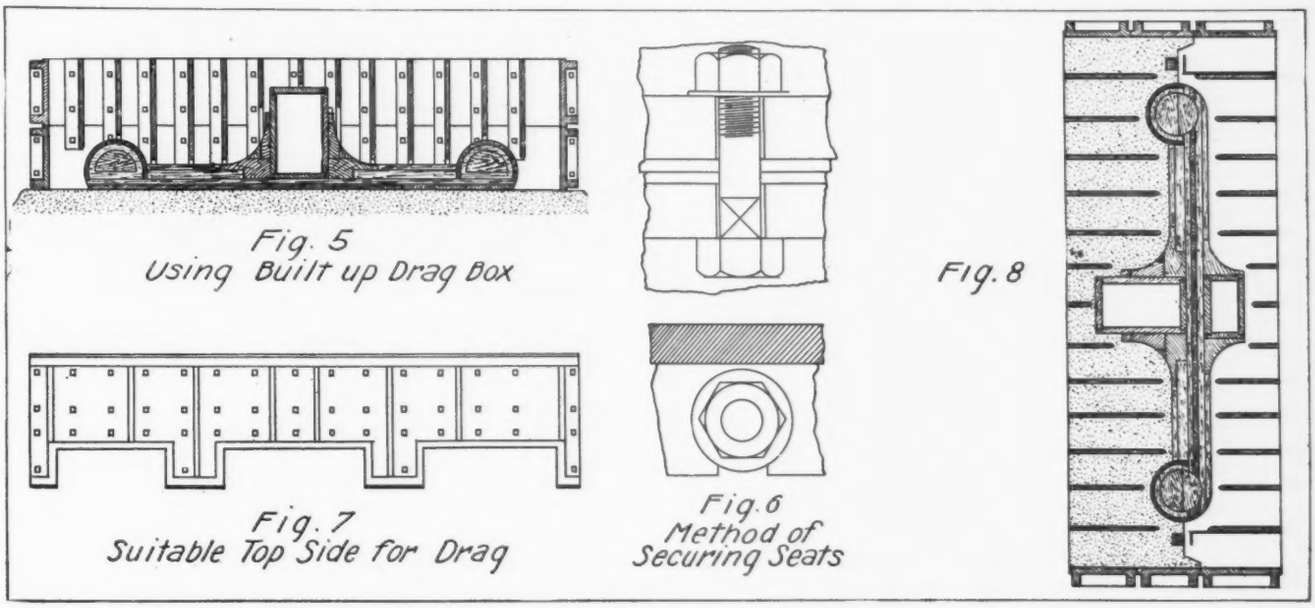


FIG. 5—SECTIONAL VIEW OF BUILT UP DRAG IN POSITION FIG. 6—BOLTS FITTING IN SLOTS IN THE FLANGES HOLD THE DRAG AND COPE TOGETHER
FIG. 7—SUITABLE TOP SIDE FOR DRAG FIG. 8—THE COPE IN POSITION SHOWING GATES IN MOLD WHERE BOSSES ARE TO BE CAST VERTICALLY

difficult matter to arrange the position of risers so that metal can be fed to the heavy parts, especially to the thick divisional plate of metal between the central cores. Two or three risers are usually brought off along the highest part of the bosses and a good riser is brought off at an angle from each side of the center piece to overcome shrinkage in the heavy web.

When a drag flask large enough to take the mold, is available in the form of a solid box, as shown in Fig. 3, the rollover process can be used and greater satisfaction will result because of the better facilities for ramming. The prepared bed on the foundry floor is equally necessary in this method and the bottom portion of the pattern is laid on in an upside down position as shown in Fig. 4.

When this type of drag flask is used a considerable number of grids are

rammed up it is rolled over, the joint of the mold made and a commencement made with the cope. In this method unless the drag and cope boxes are specially cut away to permit of casting the job on its side the metal would be cast in much the same way as in the previous instance. The advantage of using a box lying in the fact that the sand may be rammed to an even density.

Other Flasks Recommended

Another form of drag flask which is gradually being recognized as possessing many advantages for work of this kind, is the built-up box, sides and ends being bolted together and ordinary box bars bolted in between the sides. Stock bars are used as far as possible, additional ones being made to follow the contour of the pattern. Owing to the depth of the

ways or endways are usually available. Extra parts can be made to suit any individual job, and no more time would be required than is occupied in preparing suitable tackle when a solid box is available. A number of new sides or bars would increase the stock and be useful in any future work of a similar character.

The roll over process is adopted with the type of flask shown in Fig. 7, the pattern is laid upon a prepared bed and the flask set in an inverted position over it. The bars which should be a loose fit, can be lowered into position and bolted. In no place should these bars be less than 1 inch from the pattern. Providing the bars follow the contour of the pattern fairly regularly no additional support for the sand is necessary; but this is only likely to apply when all are specially made for the job. When

they are drawn from stock, gaggers should be used to support the sand and make up for any deficiencies in the bars. When the drag has been rammed it may be rolled over, a proceeding necessitating care in lifting with the crane owing to the built up nature of the flask. When it has been satisfactorily accomplished the joint can be prepared as previously indicated and shown in Fig. 8. This method gives the advantage of casting the job on its side and enables the foundryman to bring off more suitable rises likely to insure a sounder casting than in casting flat. With the bosses in a vertical position the metal can be supplied by means of sprays to each. Owing to the shape of the suitable guides so that there will be no difficulty in replacing the cope in its true relative position on the drag.

With the exception of a few small subsidiary portions representing rib extensions the entire pattern can be withdrawn with one lift; also the process of sleeking both drag and cope can be done simultaneously. To give a good solid surface, such as is required in work of this kind, the molder should not spare the nails. The joint corner should be depressed, as also should the junction of the core prints with the mold, to prevent any likelihood of crushing. Sharp corners should be rounded off, unless they are specially required and to prevent the sand giving way before the inrush being shown in Fig. 9. It will be noticed that besides the ordinary lifting staples, two smaller staples are cast on the printside of the grid. These faciliate the fastening back of the cores when they are finally placed in the mold and prevent them from lifting. Corner pieces can be set in the core box both top and bottom as a guide for the amount of corner to be removed in order to give the necessary shape to the core. This can be done when the core is sufficiently stiff. The largest of the center cores should be made with its print side on a plate; composition laid upon it and a grid, Fig. 10, bedded in after which the core box is set on. The batten carrying the core prints for

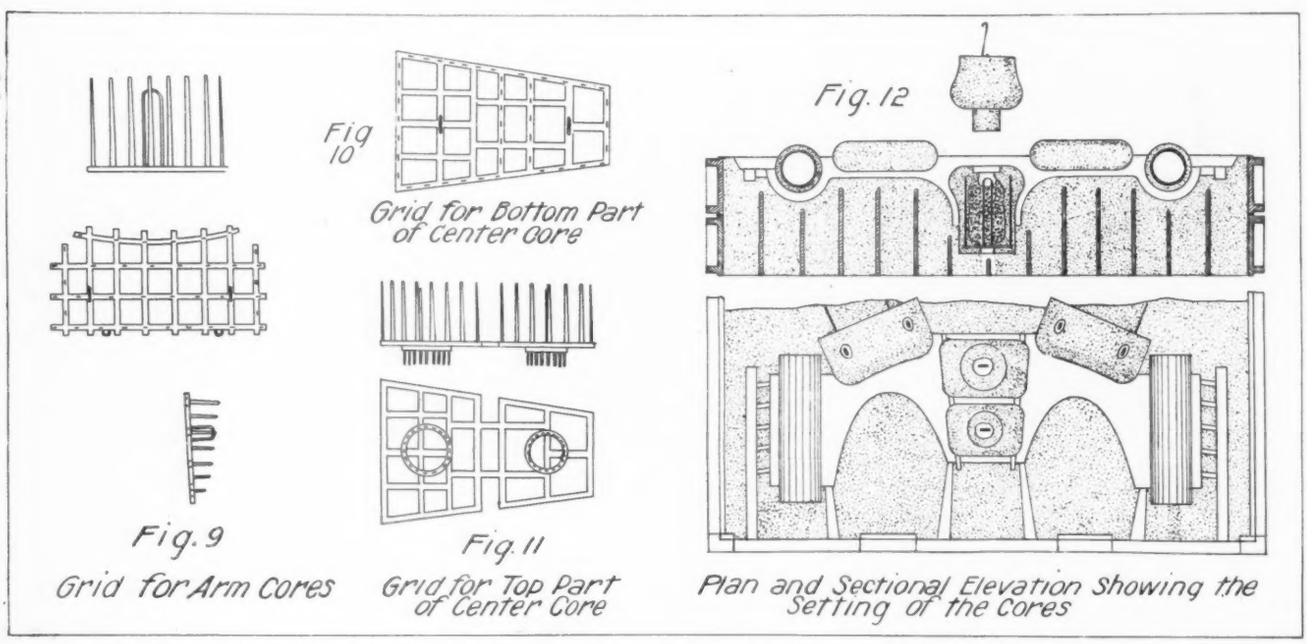


Fig 10
Grid for Bottom Part of Center Core
Fig. 12
Fig. 9
Grid for Arm Cores
Fig. 11
Grid for Top Part of Center Core
Plan and Sectional Elevation Showing the Setting of the Cores

FIG. 9—GRID FOR ARM CORES FIG. 10—GRID FOR BOTTOM PART OF CENTER CORE FIG. 11—GRID FOR TOP PART OF CENTER CORE FIG. 12—PLAN AND SECTIONAL ELEVATION SHOWING POSITION OF GATES, CORES AND RISERS

arms the highest points should be the faces of the bosses. Risers can be formed on the surface of each boss, near the junction with the arms and also attached to the thick plate between the two cores of the center piece. Allowance should be made for these before the cope box is set in position, by bedding in gate sticks leading through the side of the box. With this arrangement made and the cope box lowered into position box bars can be fastened in a similar manner to those in the drag, and shown in Fig. 8. Gaggers are used to strengthen and support any parts requiring additional supports, such as the lift at the sides of the bosses. Ramming the cope is a straight forward job, a good supply of composition being required before being backed up with the floor sand. Before the flasks are separated the precaution should be taken to attach and pressure of the molten metal should be well nailed. Both drag and cope should be transferred to an oven to be dried, if facilities are available; otherwise both parts can be dried by suspending or supporting the cope over the drag and using patent driers or coke fires, localizing the heat by surrounding the boxes with sheet iron or by whatever means are available.

The mold and cores are prepared simultaneously. The shaft cores are usually made straight and are most conveniently made on perforated spindles which are kept in stock in standard lengths. Special attention must be given to the composition used on these cores since the spray runners cause the metal to impringe upon them while the job is being cast. The mixture must be strong and of a highly refractory nature. The arm cores require grids, a suitable form the lightening holes in the center plate, is dowelled, and can be removed while the grid is being filled. A shell of about 3 to 3½ inches of composition should form this core, the inside being filled with ashes and then rammed. The lifting staples must be placed near the center line of the lightening holes. In filling boxes requiring to be struck off it is better to have the composite projecting until it is stiffened, the striking off being done just before the core box is removed. A rib cuts the smaller or top center core in two. Under such circumstances it is better to form as one core by carrying the grid through the rib and having the intervening portion of the grid cast with the job. A convenient form of grid for such a core is shown in Fig. 11. Two loose rings are made and secured to the main grid as shown. When filling this box the central rib is removed,

enough composite put in the box to form a bed for the grid which is then lowered in, the rib is replaced to get the position of grid joining the two sections and each piece notched out to allow it to be set back into its right position. The formation of the core is then proceeded with in a similar manner to the larger core. When all the cores are stripped, corners removed and sleeked over they are conveyed to a drying oven. Runner and riser basins require to be prepared and dried, the risers being given substantial heads.

Final Preparations

When the molds and cores are dried and any cracks formed properly filled in, the whole should be painted and again thoroughly dried. Instead of painting a mold and cores with a liquid solution of the composition, as is usually done for castings of smaller section, the application of tar gives better results on heavy castings of this type. The runner basins should be treated in like manner.

With the mold, cores, runner and riser basins thoroughly dried preparations can be made to close the job. In order that the mold be poured while fairly hot it is desirable to have everything ready so that no time may be wasted from the beginning of closing until the metal is poured. Other things being equal, a better casting is obtained when the metal is poured into a hot mold. A vent hole can be made through the drag flask, so that pipes may carry air and gases from the center core at each side.

The bottom center core is lowered in and the staples cleared to connect the vent with the top core, which should be lowered into position and the total height tested. A small clay worm covered with oil is placed around the vent holes and prevents the metal from entering the core vents. The two cores should be secured, by attaching hook bolts to the bottom staples and passing them through a plate resting on the grid of the top core and then screwing them up. Some molders prefer securing the top core in the cope before turning it over, but whichever method is preferred care must be exercised to prevent crushing. At the top of the center core, a part between the ribs serves as a print and to assist in a safe closing this part in the core should be tapered well back. The arm cores and shaft cores can be set, the former can be secured to stakes by hook irons as shown in Fig. 12. The latter offers no special difficulty being merely laid into the prints and the ends of the cores tapered back.

The runners and risers must be clear and their junction with the mold rounded over. The illustration, Fig. 12, shows the drag with the boss, arm and bottom center cores in position and the top core ready for lowering. When all the cores are placed, the cover boxes are turned over and lowered into position, pieces of clay having been set previously on the top core. The cope should be lowered very steadily and its position located as accurately as possible, otherwise the core and its print in the top are likely to come into contact. It is safer to lift again, after the top box has been in place, just to make sure that no crushing has taken place. If the center core is clear of the top a clay worm should be placed round the vent and covered with oil before finally closing. The two parts are bolted together and if possible lowered into a casting pit in casting position so that sand may be rammed against the sides and relieve the pressure on the boxes when the metal is being poured. The gates and risers should be stuffed with cotton waste while this is being done. The mold is fixed for casting and the prepared runner and riser basins grouted into their respective positions, ready to receive the metal.

As in all other instances, castings of this description require to be annealed so as to remove internal stresses and to give a finer and more uniform texture to the steel. The annealing furnace should be heated as gradually as possible so that the casting may be heated uniformly throughout and the temperature raised to about 800 degrees Cent. While it is important that the temperature should be raised gradually it is of greater importance that the temperature should be reduced gradually.

Expand Furnace Company

The Booth Electric Furnace Co., with a paid up capital of $1,000,000 has been organized in Chicago under the laws of the State of Illinois. The new company has acquired all the patents, assets and good will of the Booth-Hall Co., and intends to greatly enlarge the scope of its operations. L. E. Myers, Chicago, president of the L. E. Myers Co., has been elected president of the new corporation; C. H. Booth, formerly president of the Booth-Hall Co., vice president; W. K. Booth, formerly chief engineer of the Booth-Hall Co., secretary, and L. J. Clark, of the L. E. Myers Co., treasurer. In addition to the president, vice president and secretary, the board of directors will include Martin J. Insull, vice president of the Middle West Utilities Co., and E. W. Lloyd, of the Commonwealth Edison Co., both of Chicago.

Electric Furnace Men Meet to Form Association

The Electric Furnace association which met in Chicago at the Congress hotel on Monday, Sept. 22, brought together some the foremost electric steel men of the United States and Canada. The purpose of the association is to bring out the quality of products made in the electric furnace, and an interesting discussion of this subject occurred. This association is the outgrowth of a meeting held in New York last April which was attended by electric furnace men and at which time it was recognized that there was need for closer cooperation between the electric furnace designer, the power engineer and those who operate electric furnaces.

About 60 members were present at the Chicago meeting. H. G. Weidenthal read an interesting paper in which he pointed out the great demand for better steel in the automotive industry and indicated the increased demand for electric steel in that field. He recited the need for greater factors of safety in the vital parts of automobiles, trucks and tractors and showed that the electric furnace would be called upon to supply steel of the proper quality. In response to a demand for data on electric furnace products the association has gathered together information in regard to the quality of electric steel and issued it in a booklet.

A permanent organization was effected at the close of the meeting and and the following officers elected: President, Acheson Smith; vice presidents, C. H. Booth and W. E. Moore; secretary, C. G. Schluederberg; treasurer, F. J. Ryan. The association may be addressed at Box 616 Niagara Falls, N. Y.

The next meeting will probably be held next spring in conjunction with some of the national technical societies, and it is probable that a symposium on the subject of power for the electric furnace will be the principal feature of the meeting. This will give opportunity for the power engineer, the electric steel men and others operating electric furnaces to discuss the power service problem of the electric furnace. Although the present meeting was largely devoted to electric steel, it is the intention to take up nonferrous metal melting.

Following Work Through the Plant

Many Questions Regarding Production Are Answered by a Comprehensive System of Records—Causes of Defective Castings Are Recorded in Order to Follow Up and Correct Faults

BY ALEXANDER MANN

A FOUNDRY order system should be practically foolproof and should check against itself. It should be thoroughly understood by those in charge of routing orders and its requirements should be adhered to rigidly.

Do your molders lose time looking for the next job? Do they ever lose time because of the non-delivery of cores or are they compelled to wait because they can't secure the required patterns? Are they compelled to waste time because the proper flasks are not obtainable? Do your molders or coremakers make jobs other than those specified and do they make a larger quantity than required? Are your defective castings properly replaced? Are flasks and patterns of the previous day's heat stored properly? Are patterns that require checking, alterations or additions always ready for the molders on time? These and other embarrassing questions might be propounded and only the foundrymen who have installed accurate order systems can answer all of the foregoing questions satisfactorily.

The author of this article, Alexander Mann, is cost accountant with the molding machine division of the Cleveland Osborn Mfg. Co., Cleveland.

After an order system has been compiled, an instruction sheet should be prepared containing the details of the system and all of the clerks engaged in this work should familiarize themselves with its operations. The simple forms that are to be described can be applied to the requirements of almost any foundry with only slight changes.

Orders for castings to be made are sent from the plant office to the foundry office daily, or more frequently as may be necessary. In the foundry office they are copied into a casting-on-stock file or casting-on-order file, depending upon the class to which they belong. These orders remain in these files until all of the castings have been shipped. The production schedule shown in Fig. 1, should be filled out by one familiar with the product that is being made and this should list the work for the following day. This blank has a space for the names of the molders and other spaces for the pattern number, name, number of castings required, order number, etc. In the column at the left, space is provided for inserting the number of cores required for the heat, two days in advance of casting, because the cores for a job must be made a day ahead of the work on which the molder happens to be employed. Four copies of this production schedule will be sufficient. When filled out, these blanks should be checked carefully before they are distributed to destination. These four copies should be handed to the heads of each department involved, shortly after the noon hour to prevent molding delays. A copy of the schedule showing the number of cores to be made accompanies and forms a part of the production schedule. One copy of this schedule is delivered to the foreman of the pattern shop, who will have an opportunity to check and alter any patterns in time for the molder the next morning. Another copy is delivered to the man in charge of the pattern storage, who lays out the patterns and loose pieces required the next day and he also stores the patterns which the production schedule indicates are no longer required in the foundry. One copy is filed in the foundry office to which reference frequently is made and another copy is handed to the foundry foreman who notifies the molders what they are to make the following day. The tag on one end referring to the number of cores required is torn off the foundry foreman's copy and given to the workman in charge of the core room.

Individual-Production Slip for July 30 1919.
Pieces Mentioned Below to be Made By ..... Clock No. .....

Quan	Pattern No	Piece Name	Order No.	Draw No	Remarks
5	B-275	Plate	27123	E250	
1	BA-843	Cover	29215	D1011	

(1)

Made Out and Checked By .....

Report of Foundry Orders Finished-Date July 30 1919

Order No.	Description of Order	Checked	Remarks
51126	1-#526 Type C Valve	✓	
59324	100-10H261 Trays	✓	

(3)

Made Out and Checked By .....

Cores to be Made On July 31 1919

Quan	Description
1	A271 Body
7	AB42 Valves
3	C29 Piston

Production Schedule for July 30 1919

Molder	Clock No.	Quan	Patt No	Piece Name	Order No	Draw No	Remarks
Smith	528	1	A271	Body	51126	E892	
"	"	7	AB42	Valves	4918	E670	
Jones	497	3	C29	Piston	10112	D26	

(2)

Tear off on Heavy Line-This Schedule Made Up and Checked By .....

Bad Work Date July 30 1919

Quan	Patt No.	Piece Name	Order No.	Made By	Clock No	Reason Defective	Check When Replaced	Noted By Cost Dept.
1	A742	Gland	5253	Smith	528	Blow Holes	✓	CM 7/6/19
4	H2662	Wheel	5715	Jones	497	Drop M	✓	A.R. 7/6/19
2	H2663	Pulley	5372	Brown	530	Defective Cores O		
1	A786	Cover	5476	Mitchell	527	Pared Shift		
1	H2552	Inside Ring	5476	Miller	524	Cracked O		
1	A724	Pedestal	5672	O'Brien	542	Broken O		

(4)

"M" Indicates-Defective Against Molder "O" Indicates-Defective for Other Reasons
Made Out and Checked By .....

FIG. 1—INDIVIDUAL SLIP FOR MAN ENGAGED ON ODD WORK FIG. 2—THESE CARDS ARE KEPT IN THE FOUNDRY OFFICE UNTIL ALL DEFECTIVE CASTINGS ARE REPLACED FIG. 3—ADVANCE PRODUCTION SCHEDULE—ORDER FOR CORES ON DETACHABLE STUB FIG. 4—SAMPLE PAGE OUT OF BAD WORK BOOK FOR PURPOSES OF COMPARISON AND SECURING VALUABLE DATA. A DAILY, MONTH AND SEMIANNAUL RECORD IS KEPT OF ALL DEFECTIVE WORK

If a molder produces many small pieces or a large variety of job work, a separate or individual production blank, Fig. 1, should be filled out and handed to the molder. On this slip spaces are provided for the molder's name, number of castings required, pattern number, description of the castings and the order number. The judgment of the clerk figuring the production schedule is the determining factor in deciding which molders shall receive individual production cards.

The cores necessary for all castings are marked on the production schedule. The individual production card is made out in triplicate, one copy for the molder, another for the man in charge of the pattern storage and the third is filed in the foundry office. An inspection of the production schedule is a guide to the foreman for the flasks required and those which no longer are needed and should be taken out to the flask storage. This facilitates the delivery of the flasks to the molders and also insures the removal of flasks no longer needed. Just before the heat is poured, a foundry clerk ascertains how many molds each molder has made and this is entered on a daily heat sheet which required no description. If considered advisable, the heat report can be copied into a book every day to provide a permanent record. The daily production is checked against the daily heat sheet, and when a sufficient number of castings for any order has been made, this information is entered on a card recording foundry orders finished and shown in Fig. 3. A sufficient number of these blanks should be filled out to provide thoroughly for the needs of all departments.

The list of bad work, as indicated by the heat sheet, should be copied into a "Bad Work" book, a page from which is shown in Fig. 4. When the defective castings have been replaced the job is checked in this book. One of the interesting and valuable features of the "Bad Work" book is the column in which is entered the reason for a casting being defective. It will be noted from Fig. 4, that Jones had four bad castings, due to drop-outs; Smith had one defection casting due to blow holes; Brown had two defective castings because of the breaking of the cores; Mitchell had one defective casting because he poured short; Miller had one defective casting because it cracked and a defective casting charged against O'Brien was broken in the tumbling barrel. This information also enables those in charge of the foundry to decide what and how many defective castings should be charged against the molders if they were to be changed and engage in piecework molding.

Periodically, reports are compiled from this "Bad Work" book, showing the percentages of defective castings due to the faults of the molders. Forms for this purpose are shown in Figs. 5, 6 and 7.

In addition to this check, castings made each day by every individual molder are copied on to another card. Monthly and semiannual recapitulations are made from these cards onto cards, Figs. 5 and 6. In this way valuable data is secured. Posting this information on a bulletin board creates a spirit of rivalry among the molders and it frequently is desirable to pay bonuses to the molders scoring the lowest percentages of bad castings. However, care should be exercised by the foundry foreman or other shop executives to see to it that the true reasons are assigned for the causes of all bad castings. If necessary, a copy of the "Bad Work" report can be sent to the cost department for their use and information as needed.

Castings Report of S. Jones Month of July 1919

Day	Lbs. Made	Lbs Defective	
1			
2			
3			
4			
5			
6	4133	148	
7			
8			
9			
10			
21			
22			
23			
24			
25	4919	148	
26			
27			
28			
29			
30			
31			
Total	9052	296	

(5)

Monthly Report-Defective Castings-Against Molders July 1919

Molder	Clock No.	Pounds Cast	Pounds Defective	% Bad	Remarks
Jones	497	9052	296	3%	
Smith	528	15225	—	All Good	

(6)

Comparisons of Defective Casting Monthly Reports Jan to June 1919 Inclusive

Molder	Clock No.	Jan	Feb	Mar	Apr	May	June
Jones	497	All Good	All Good	16	27	32	All Good
Smith	528	5	7	21	2	5	9

(7)

FIG. 5—DAILY CASTING REPORT OF INDIVIDUAL MOLDER FIG. 6—MONTHLY REPORT OF DEFECTIVE CASTINGS TRACEABLE TO MOLDERS FIG. 7—RECAPITULATION OF DEFECTIVE CASTINGS REPORT FOR A PERIOD OF SIX MONTHS

Facing Sands for Use in Steel Casting

By Pat Dwyer

Question—Is there any standard facing for steel castings? Practice in this district is very confusing. Mixtures are being changed all the time. Please tell me what kind of facing is used in the best steel shops for dry sand, green sand and skin dried molds? What is the weight of the heaviest castings made in green sand?

Answer—There are as many varieties and combinations of sand for steel facing as there are for iron. The location of the shop, the class of work, the nearest available sand supply and the experience of the man in charge are some of the factors which have a bearing on the selection of facing sand.

The same freedom and latitude are observed in determining whether a casting is to be made in green or dry sand. Some foundries make all their castings, including jobs weighing up to 1000 pounds in green sand; while other shops dry every mold they make.

The following is an average facing sand mixture which may be modified according to your experience as you go along. *For dry sand and skin-dried molds:* 10 measures of silica sand, 1 measure of silica clay, wet with molasses water. *For green sand:* 10 measures of silica sand; 1 measure of silica clay, and 5 measures of old molding sand. In order to get uniform results the sand should be mixed in a grinding pan for about 10 minutes.

Green-sand molds which are to be poured from a bull ladle are made exactly like molds for iron castings. If they are to be poured from a crane ladle they require pouring cups on the runners and a piece of slab core on the bottom of each gate.

The Chicago Pneumatic Tool Co., Chicago, has removed its Birmingham, Ala., office from 801 Brown Marx building to 1925 Fifth avenue north, where a complete line of equipment and repairs will be maintained.

Institute Presents Varied Program

Three Sessions Held at Which Many Interesting Metallurgical Papers Were Presented —Pure Aluminum Has Been Produced—Foundry Tests of Zinc Bronzes—Light Alloys Discussed

THE sessions of the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers, held in conjunction with the foundry convention took place in the Ritz Carlton hotel, commencing Tuesday evening, Sept. 30. Two papers were presented, the "Physical Properties of Nickel," by David H. Browne and John F. Thompson, New York, and "Some Properties and Applications of Rolled Strip Zinc and Drawn Zinc Rod," by C. H. Mathewson and W. H. Finkeldey. The paper on the physical properties of nickel outlined some of the processes followed in the production of nickel. The method that produces most of the nickel used in the United States is known as the Orford process which consists of various operations by which the nickel is converted into sulphide and lastly oxide, which is then reduced by charcoal to metallic nickel produced in the form of blocks, or as shot. The purest grade of nickel is obtained by electrolytic deposition on cathodes, and is either sold uncut, or is cut into small pieces for crucible melting.

There are five different forms in which nickel is found on the market, but most of it is in the form of shot or blocks produced by the Orford process. There are two grades of shot nickel, A and X. The first is a high carbon nickel used by anode manufacturers, the second a purer material is used by manufacturers of crucible nickel steel and nickel silver. Ingot nickel is almost identical with shot nickel which contains about 98.40 per cent nickel for the A grade shot, 98.90 to 99 per cent nickel for the X grade and 99.80 per cent nickel for the electrolytic nickel.

Nickel for Casting Purposes

For the production of nickel alloys, nonmalleable nickel is generally used. The point about nickel that Dr. Thompson particularly wished to emphasize is that in its relations to carbon, it is closely related to iron, and that its physical properties as a metal are subject to the same modifications by carbon as are those of iron, and consequently there are as many "alloys" of nickel and carbon, as there are of iron and carbon.

The first paper presented on Wednesday was "Five Foundry Tests of Zinc Bronzes," by C. P. Karr, Ph. B., Washington, D. C. This paper describes a series of five tests of the alloy, copper, 88 per cent; tin, 10 per cent; zinc, 2 per cent, made a considerable time ago by the following foundries: The Ohio Brass Co., Mansfield, O.; Titanium Alloy Mfg. Co., Niagara Falls, N. Y.; Franklin Motor Car Co., Syracuse, N. Y.; National Cash Register Co., Dayton, O., and the bureau of mines, Washington, D. C. The test showed that the highest and most uniform results are obtained when the metal is cast into chill molds; the best sand mold results when it is cast in skin dried molds and poured flat, in case of virgin metal. A tensile strength of 40,400 pounds per square inch was obtained with the sand cast tests, with 16 per cent elongation, and 14.8 per cent reduction of area. The chill mold gave 44,100 pounds tensile; 27.3 per cent elongation, and 23.7 per cent reduction. This result would be expected. A second series of tests an alloy of, copper, 88 per cent; tin, 8 per cent, and zinc, 4 per cent was tested as well as the 88-10-2 alloy. The pouring temperatures were established at from 1100 to 1300 degrees Cent., and the castings were made in cores bonded with linseed oil. The bars were cast with a fingate, and the results for 88-10-2 are averaged at 38,900 pounds tensile strength, 12,200 pounds proportional limit; 25 per cent elongation, and 21 per cent reduction. For the 88-8-4 they were 39,400 pounds tensile; 11,000 pounds proportional limit; 32 per cent elongation, and 25 per cent reduction.

A paper on "Lead-Zinc Bronzes," by H. F. Staley and C. P. Karr, described the results of an investigation of the properties of nine different alloys commencing with 88-10-2, and 88-8-4; lowering the tin and adding lead. The substitution of zinc for tin gave lower physical tests, and that of lead in place of zinc resulted similarly. Ease of machining increased with the decrease of tin and increase of zinc. The thickness of the chips increased with increase of lead. A very satisfactory alloy was found to be composed of copper 90 per cent; tin 6.5 per cent; lead 0.5 per cent, and zinc 3 per cent. This alloy has a tensile strength of 40,700 pounds per square inch, a proportional limit of 12,200 pounds, an elongation of 37.6 per cent, and reduction of area of 34 per cent. It can be used for valves, pistons and similar castings. The discussion brought out that a very similar alloy consisting of copper 90 per cent; tin 6.5 per cent; zinc 2 per cent; lead 1.5 per cent, becomes a very good watertight casting alloy when 1 per cent of nickel is substituted for 1 per cent of copper. Such castings ½-inch in section, fully machined on both sides, withstand a water pressure of 150 pounds, up to 3000 pounds.

The manufacture of manganin prior to the war was entirely in the hands of foreign manufacturers. Manganin is a very important alloy to the electrical industry, and although the composition was fairly well known many unexpected difficulties were encountered when attempts were made to produce this alloy in the United States. The composition as given by different authorities varies considerably. Ultimately the following alloy was decided upon: Copper, 83 parts; nickel, 2.5 parts; manganese, 14 parts; pure iron 1½ parts; total 101 parts. The copper and the nickel are charged together and melted, then the melt is covered with charcoal. The manganese is added gradually at this stage, and the alloy is allowed to heat up, when the iron is added as thin wire or sheets. The molten metal is then deoxidized with 0.1 per cent of magesium, and cast into ingots.

Some Light Alloys

The session on Thursday was dominated by papers dealing with the metallurgy of the light alloys of aluminum, such as duralumin. A paper on the "Heat Treatment of Aluminum Alloy Castings," presented by W. A. Gibson, in the absence of Zay Jeffries, coauthor, mentions the fact that some aluminum alloys can be hardened by quenching from a temperature of about 500 degrees Cent., and that the hardness of the alloy will increase gradually until in four days it reaches a maximum. The alloy most generally heat treated is duralumin. It has the following composition, copper not over 6 per cent, magnesium not over 2 per cent; manganese, not over 1 per cent; commercial aluminum, balance. A typical good alloy will have the composition, copper 4 per cent; magnesium 0.5 per cent; manganese 1 per cent, and aluminum, balance. In four days after heat treatment, the rolled or extruded alloy will have a tensile strength of from 55,000 to 60,000 pounds per square inch, with an elongation in two inches ranging from 15 up to 20 per cent.

FORMULAS FOR THE BRASS FOUNDRYMAN

Comparative Hardness of Alloys

Copper, Nickel and Manganese Alloys

Alloy			Comparative Hardness Averaged		
Copper	Nickel	Manganese	Chilled	Annealed	Annealing Temp.
Per cent	Per cent	Per cent	Casting	3 hours	Deg. Cent
84.00	8.00	8.00	111.00	117.50	900
81.00	4.00	15.00	119.00	113.00	900
77.00	8.00	15.00	127.00	119.00	900

Composition of Alloy

	Per Cent
Copper	64.00
Tin	2.00
Aluminum	2.00
Iron	2.00
Zinc	30.00

This alloy is known as Durana metal. Its hardness in chilled castings averages 197.50; when annealed at 800 degrees Cent. for 3 hours its hardness is 241.50 as determined by the conical impression test.

Ferro-Bronze Alloy

Composition of Alloy

	Per Cent
Copper	58.00
Zinc	40.00
Iron	2.00

The hardness of ferro-bronze in chilled castings is 137.50; when annealed at 800 degrees Cent. for 3 hours the hardness is 150.50.

Copper and Bismuth Alloys

Alloy No. 1	Per Cent	*Alloy No. 2*	Per Cent
Copper	96.00	Copper	92.00
Bismuth	4.00	Bismuth	8.00

The hardness of alloy No. 1 is 51.65 in chilled castings, and 49.75 when annealed. The hardness of No. 2 alloy is 55.80 when chilled, and 61.15 when annealed.

FORMULAS FOR THE BRASS FOUNDRYMAN

Comparative Hardness of Alloys

Copper and Silver Alloys

The comparative hardness of alloys of copper and silver as determined by the conical impression test is as follows:

Alloy No. 1	Per Cent	*Alloy No. 2*	Per Cent
Copper	96.00	Copper	92.00
Silver	4.00	Silver	8.00

The hardness of alloy No. 1 is 80.40 in chilled castings and 88.50 when annealed at a temperature of 700 degrees Cent. for a period of 3 hours.

Copper and Antimony Alloys

Alloy No. 1	Per Cent	*Alloy No. 2*	Per Cent
Copper	96.00	Copper	92.00
Antimony	4.00	Antimony	8.00

The hardness of alloy No. 1 is 102.00 in chilled castings, and 101.50 when annealed at a temperature of 590 degrees Cent. for a period of 3 hours.

Copper and Magnesium Alloys

Alloy No. 1	Per Cent	*Alloy No. 2*	Per Cent	*Alloy No. 3*	Per Cent
Copper	99.00	Copper	96.00	Copper	92.00
Magnesium	1.00	Magnesium	4.00	Magnesium	8.00

The hardness of alloy No. 1 is 95.05 in chilled castings, and 90.30 when annealed at 700 degrees Cent. for 3 hours. The hardness of No. 2 chilled is 183.00; and annealed, 183.50. The hardness of No. 3 alloy is 303 chilled, and 302 annealed. These values were obtained in the same manner as those of all the previously mentioned alloys, and illustrate the intense hardening effect of magnesium on copper which is almost double that of tin from 4 per cent magnesium up, and approximately 11 times that of zinc.

THE FOUNDRY DATA SHEET, OCTOBER 15, 1919

Payment will be made for all contributions on foundry and pattern shop practice suitable for publication

Note—This sheet may be cut into two sections, 5 x 7 inches, and may be readily bound in note book form.

During the discussion that ensued, George K. Burgess, bureau of standards, Washington, D. C., mentioned that as pure aluminum has not so far been attainable, it has not been possible to ascertain the precise effect of such impurities as silicon and iron on the properties of the metal. As it was most desirable to ascertain this, for the benefit, more particularly, of the aircraft activities of the government, the bureau has taken up the problem of producing pure aluminum and a solution having been arrived at, he was able to state that pure aluminum would shortly be available for the purposes of research.

The attendance at the last session of the series was very good, being greater than that of any previous session. At the conclusion of the session, W. M. Corse and also Harold J. Roast, directed attention to the lack of practical papers on brass foundry topics and the members were strongly urged to come forward with contributions along this line for presentation at future meetings.

How and Why in Brass Founding

By Charles Vickers

Stamp Seal Metals

We wish to know of a formula for a white metal suitable for a stamp seal, that will take up the finest detail from the brass half. Also what can be used to prevent the metal from sticking to the brass half when it is poured?

The following alloy will be satisfactory for the purpose outlined: Tin, 95 per cent; antimony, 4 per cent; copper, 1 per cent. This will run well and take the finest details. A cheaper alloy would be lead, 80 per cent; tin, 10 per cent; antimony, 10 per cent. If the brass half of the mold is rubbed with dry plumbago and then is well brushed with a soft bristle stiff brush until it is polished to a stove-like luster, the white metal will not stick to the brass. This polishing should be repeated frequently, and the white metal must not be poured so hot that it will cause a piece of wood that is inserted into the molten metal to ignite and burn.

Pickling Brass Castings

We want to use a pickle for cleaning our brass castings, and wish to obtain details concerning such a bath, and the acids to use. The castings weigh from ½ pound to 400 pounds each.

We believe the slow process of pickling would be more satisfactory for general castings such as those described. This consists in immersing the castings in a bath of sulphuric acid and water for several hours and some times over night. The bath is made by mixing one part sulphuric acid to 10 parts water. The container must be of wood, lead lined or well coated with asphaltum. The castings should be well rinsed after being removed from the acid in rinsing water containing a little lime. For quick cleaning, a solution of two parts sulphuric acid and one part of nitric acid often is used. The castings are immersed a few moments and then are removed and washed in running cold water, then in hot waer and dried in sawdust. Considerable skill is required in manipulating these dips and pickles, and until this is acquired they must not be expected to prove entirely satisfactory. The nitric and sulphuric acid mixture must be operated under a hood, and great care must be observed to avoid breathing the fumes, especially the red fumes given off from the nitric acid on attacking the brass. These fumes when breathed unconsciously for some time have a serious effect and at times have proved fatal within 36 hours.

Pitch Repelling Metal

We are looking for a metal to which pitch will not adhere when hot. We have found aluminum to give the best results but it is not entirely satisfactory, and we are turning our attention to the alloys of aluminum. We would greatly appreciate any information you could furnish in regard to this matter.

This is a peculiar requirement and as far as we are able to determine no research work has been done in connection with the adhesion of hot pitch to metal surfaces. The aluminum alloys would naturally suggest themselves because it is difficult to get solders to adhere to them on account of the film that always forms when they are exposed to the air. At the rich aluminum end of the series, there are none better than the reliable No. 12, which consists of aluminum 92 per cent and copper 8 per cent. We suggest a trial of this alloy. At the other end of the scale, the rich copper alloys, an alloy of copper 90 per cent, and aluminum 10 per cent would be worth a trial. Neither of the alloys mentioned can be rolled, but we assume the metal is desired for castings, and believe the two alloys will afford the best possible selection for testing out with pitch.

Holding Lead in Copper

We are making an alloy consisting of copper 68 per cent; lead, 25 per cent, and tin 7 per cent, and would appreciate any information you might feel disposed to give us in regard to holding the lead in solution, as we understand this alloy is difficult to make.

If any difficulty is experienced in retaining the lead in the alloy, this can be overcome by simply reducing the tin content to 5 per cent, and increasing the copper to 70 per cent. Alloys having 30 per cent lead and 5 per cent tin, and the remainder copper are made in great quantity and find service as car journal bearings and no especial difficulty is encountered in making them. Quite frequently a little nickel is added to the alloy, and before reducing the tin it might be well to add 1 per cent nickel to the 25 per cent lead alloy, and reduce the copper by 1 per cent.

Molding Defects Cause Trouble

As a result of a recent change of foremen we have had considerable difficulty with our smaller castings. The new man is very good on the heavy class of work, but seems unable to get out the smaller castings as perfectly as we desire. Some of the castings are exposed to steam pressures up to 150 pounds and we would like to have you suggest a suitable formula for this purpose. We want a good, soft metal that will machine nicely and that will withstand the service to which these castings are subjected.

As a sample of the molder's art, the casting submitted is open to much criticism. The casting is smooth enough externally, although it has been considerably battered in tumbling, but its appearance has been ruined by too much grinding, due to the effort to correct the mismatching of cope and drag caused by a

shift of the pins of the flask. The half of the mold carrying the gate, whether this is cope or drag, has been rammed too soft, with the result that the casting has swelled at the joints and also on the hexagon part under (or above) the core print. The remedy is to ram the molds harder or what is better to *tuck* the sand before it is rammed. The small projection is marred by a hole produced by a crush of the sand at the joint due to soft ramming. The flange is rough because the pattern is made too straight at this point, and to avoid the breaking away of the sand when the patterns are drawn, it would be advisable to give this a little more taper, as this would not add to the weight of the casting and would make a great improvement in its appearance.

The core is not sufficiently smooth for a small casting and there is probably too great a proportion of sharp sand in the mixture. More molding sand should be used and less sharp sand. The cores are simple to make and should require no coating to produce nice, smooth castings.

In order to criticise the metal it would be necessary to make an analysis, as we are at a loss to know how to suggest changes in an unknown composition. An alloy of copper, 85 per cent; tin, 5 per cent; zinc, 5 per cent, and lead, 5 per cent, is frequently used for similar work.

Acid Resisting Bronzes

We desire to obtain a formula for an acid-resisting bronze.

The more perfect the bronze is the more free from oxides and other dirt, the better the service that it will render when exposed to acids. This is more important than the composition of the metal, as the acid, no matter what it may be, will always commence its attack on the metal at some weak spot caused by dross. Too much care cannot be exercised in melting the metal, and it is always best to make the alloy from new metals, ingot it first and remelt the ingots for castings. The following alloy when made with care is satisfactory for pulp mill work: Copper, 82 per cent; tin, 8 per cent; lead, 8 per cent; zinc, 2 per cent. Before placing the copper into the crucible, put in the bottom three ounces of phosphor copper containing 15 per cent phosphorus, and add enough charcoal to form a perfect cover to the copper as it melts. When the copper is molten, stir thoroughly with a carbon rod and then add the white metals. Pour at a good heat and have heavy risers if the castings has thick sections which will require to be fed.

Wire Cloth Scrap

We have a quantity of wire cloth on hand such as is used on paper machines, and wish to learn if this can be used economically as scrap in a small brass foundry, and if so what is the best method of using it. Would it be advisable to pig it off from a cupola lined to 26 inches, and then use the ingots as required ?

This wire cloth, known as Fourdrinier cloth, consists of copper 80 per cent; zinc, 20 per cent, most generally, although there is a grade containing over 5 per cent tin. This is known as "bronze" wire, and has a different color to the regular alloy. This brass wire makes excellent scrap for brass foundry alloys, and it should be used in the form of closely compacted bundles, made by pounding the wire into a cast iron mortar shaped like an egg cup, and of such a size that the bundle of wire can be inserted easily into the crucibles. Use the wire in all the alloys in place of zinc as follows: Assume an alloy of copper, 85 per cent; tin, 5 per cent; zinc, 5 per cent, and lead, 5 per cent, is desired. First melt 65 pounds of copper under charcoal, then add 25 pounds of brass cloth, which had better be in two bundles; one bundle is added and the copper will take it, if it is hot, and the bundle has been warmed a few minutes on top of the pot. When the brass is melted stir the mixture well, and close the furnace to allow time for heating again, then add the other bundle of wire cloth, then the tin and lead part of the mixture. For a yellow brass mixture, simply melt wire. Do not put so much in the crucible that it will protrude above its top, until a bath of metal is obtained. Use charcoal and a little salt to prevent oxidation, when the wire is all melted add 2 pounds tin, and 3 pounds lead to the hundred pounds. It is not advisable to attempt to melt yellow brass of any kind in a cupola. If an attempt is made to ingot the cloth, there will be much loss of metal, and the ingots will vary in composition.

Crucible Melting of Monel Metal

We would like to know if it is possible to melt monel metal in a crucible in a natural draft coke-fired furnace?

Whether monel metal can be successfully melted in a natural draft coke-fired furnace will depend upon the draft of the stack, the size of the flue leading from the furnace to the stack, and the method of handling the furnace.

If any difficulty is experienced in melting copper it is hopeless to consider melting monel metal, as copper melts at 1982 degrees Fahr. and monel metal at 2480 degrees Fahr. When it is considered that mild steel melts at 2552 degrees Fahr. and wrought iron at 2768 degrees Fahr. and that both these metals have been not only melted in a coke-fired natural draft furnace, but super-heated to the point of running thin castings, it will be realized that monel metal ought to be melted with ease.

It will be found necessary to place a stool on the grate bars on which to stand the crucible, also to place a cover on the crucible to keep the coke out of the metal, then in firing the crucible should be buried under coke; that on top of the pot is a reserve for poking down the sides when the latter coke is burnt away; thus the pot is not chilled, for the cold coke is always fired on top to preheat. Given a good draft monel ought to melt easily with a 45-foot stack, as this stack has melted Swedish iron in a crucible in such a furnace. An oil or gas-fired furnace is better for melting refractory metals as it does not require the same skilled attention and refining necessary in the other type mentioned.

Cheap Tablet Mixtures

We would like to have some good, cheap mixtures for tablets and name plates. We have tried such alloys as copper 90 per cent, tin 7 per cent, zinc 3 per cent; copper 82 per cent, tin 2 per cent, lead 8 per cent, zinc 8 per cent; and copper 87 per cent, tin 3 per cent, lead 2 per cent, and zinc 8 per cent, but in all cases the plates have to be copper plated in order to take a dark oxidize, and we would like a mixture that will take this color without being copper plated.

If it is a question of cost of the metal, the cheapest method would be to use a yellow brass mixture containing approximately 40 per cent zinc; a little lead, 1 or 2 per cent, and about 2 ounces aluminum per 100 pounds of alloy. It would be necessary to coat the plates with copper as is now being done, but this is inexpensively and easily accomplished. It will not be possible to find a cheaper mixture than copper if the copper plating is to be dispensed with, provided it has been determined that no metal but copper will take the desired finish. In order to get solid castings for this purpose it would be advisable to add about 3 per cent zinc, preferably in the form of yellow brass of known analysis, and should the castings be too soft it will be necessary to add tin, in which case the first alloy mentioned would soon be arrived at. It would be advisable to continue with one of the alloys previously tried and to continue to copper plate the castings in preference to trying to cast them of copper, which is most likely to prove too soft.

Experts Consider Safety Methods

Largest Convention Ever Held to Discuss Safety and Accident Prevention Devotes Time to the Peculiar Problems of the Foundry Industry—Industrial Management Problems Also Presented

SAFETY and accident prevention, vital questions in the light of labor shortage in all lines and more particualrly in foundries at this time, formed the basis for the largest meeting of the National Safety council ever held. This convention which was held in Cleveland on Oct. 1 to 4 attracted some 3000 delegates from practically every field of industry. One hundred and sixty speakers presented the progress of safety work in all lines. Iron and steel officials were notably active, the strike and resulting idleness in the mills permitting many to attend who otherwise might not have been able to be present.

Accident prevention in foundries engaged the attention of delegates to the metals section before which two papers on safety work were read, followed by general discussion of successful methods.

Declaring that foundry work must be made more attractive and more safe if men are to be held in the industry, H. L. Church, of the Rockford Malleable Iron Works, Rockford, Ill., emphasized the human element in a discussion of the subject, "Accident Prevention in a Malleable Iron Foundry."

Because of the relatively small amount of machinery engaged, compared with that in a factory, Mr. Church asserted that the vital necessity of successful safety work in a foundry is personal education, persistently carried on, particularly among the apprentice workmen and illiterate foreigners.

"One of the greatest problems to be faced in accident prevention in foundries is the foreigner who can read no English and little if any even in his own tongue, and who in his native country was not taught even the rudiments of ordinary sanitation and safety," the speaker said. "Poster broadsides are not effective with this class. Pictures, however, speak all languages."

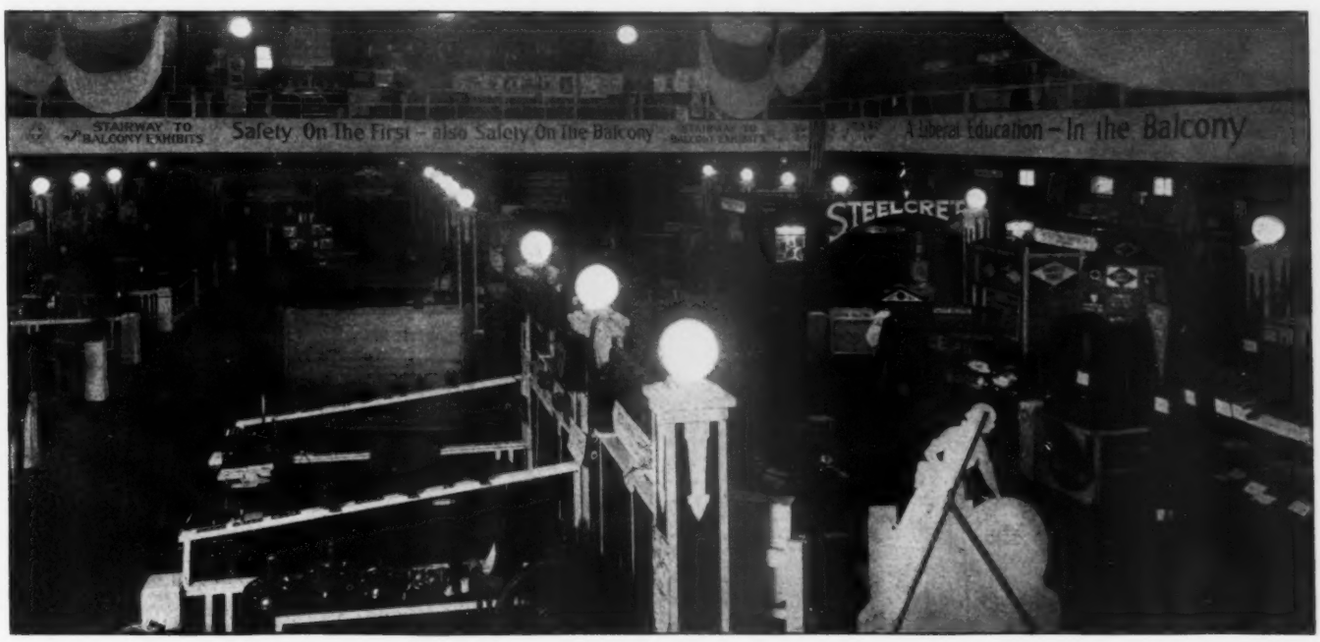
Mr. Church outlined a plan put in effect by his company, by which a versatile linguist comes into contact daily with the men of all nationalities, for direct personal safety propaganda work. Another phase of the Rockford company's activity along these lines is a check-off system employed to ascertain the causes of failure to report for work, the employe being called on at his home the same morning to see if an unreported accident was the cause of his being absent. In such a case, the workman is taken in a company automobile to the firm's physician where medical attention is given until he is ready to return to his job in good condition.

The personal element in a safety program for the foundry was also emphasized by M. F. Gartland, of the Marion Gray Iron Foundry Co., Marion, Ind. This paper is abstracted on another page of this issue.

Cyrus McCormick Jr., works manager, International Harvester Co., opened the first general session with an address on "Co-operation and Industrial Progress." Mr. McCormick summarized the general industrial situation and then outlined the plan of employe representation in operation in the plants operated by his company.

"So far as trade unionism is concerned our friends of the American Federation of Labor have mistaken the trend of employe representation," said Mr. McCormick. "Employe representation has not been set up in opposition to organized labor. It is a sincere effort on the part of capital and labor together for the benefit of each, and to develop between them a family feeling of mutual interest which cannot but be helpful to the development of industry today and tomorrow."

E. B. Tolsted, Independence Bureau, Philadelphia, said there are 150 plans of employe representation in operation in the United States, and he gave some practical suggestions


STAIRWAY TO BALCONY EXHIBITS
Safety On The First - also Safely On The Balcony
A Liberal Education - In the Balcony
STEELCRETE

GENERAL VIEW OF THE EIGHTH ANNUAL SAFETY AND SANITATION SHOW HELD IN CLEVELAND

for the installation of a satisfactory plan.

"Install it under peaceful conditions," he said. "One large company inaugurated a plan as a result of a strike and the plan ended in another strike. To propose a plan to the men on the verge of a strike is almost certain to result in failure.

"To attain its highest success, a plan should be developed gradually, each step insofar as possible resulting from suggestions or requests of employes. See that it is simple in form. The best results have been obtained with joint committees, but employes committee sould have opportunity to discuss their affairs without the presence of the management. It is especially important to make it plain that the plan in no way interferes with membership in unions."

Thomas Stanion, Aluminum Castings Co., Cleveland, presided at the general round-table discussion Oct. 2 at which L. A. DeBlois, E. I. du Pont de Nemours & Co., Wilmington, Del., urged more extensive supervision as a safeguard against accidents in industrial plants. John A. Oartel, director of safety, Carnegie Steel Co., Pittsburgh, outlined the duties of workmen's inspection committees at the A, B, C session, so-called because most of the addresses related to the rudiments of safety work.

Hans Rieg, chief, foreign language division, war loan organization of the United States treasury; H. C. Waller, formerly educational director, B. F. Goodrich Co., Akron, O.; George C. Fout, supervisor of night schools, Youngstown Sheet & Tube Co., and Allen T. Burns, director of the Study of Methods of Americanization, New York, spoke at the general session on Americanization. Mr. Burns outlined principles and methods of Americanization, while Mr. Waller and Mr. Fout suggested steps which industrial establishments may take to aid the movement. Mr. Rieg warned against trying to compel the alien to become an American citizen.

"I am of the firm conviction that headway can be made only if we centralize plans of Americanization under United States government control and supervision, backed up by proper, special and badly needed legislation,"

At the meeting of the metals sections Oct. 3, C. C. Rausch, assistant director, Safety Institute of America, gave a practical talk on the safe operation of cranes, supplemented by a discussion by O. J. Lewis, McKinney Steel Co., Cleveland. In speaking on "New Ways to Put Safety Across in a Steel Plant," H. P. Heyne, United Alloy Steel Corp., Canton, O., said:

"The new way to put safety across in any plant is to meet the problems with a better understanding of affairs, and an assurance of fairness between the foremen and employes which should furnish the material for erecting the foundation for the co-operative spirit. The two factors which bind men together are fellowship and good will based on mutual confidence. These are indispensable in attaining unity of purpose on the part of all for the welfare of all."

Ralph C. Richards, Chicago, member of the central safety committee of the Chicago & Northwestern railroad, was elected president of the council; C. W. Price, Chicago, general manager, and Sidney J. Williams, Chicago, was re-elected secretary and chief engineer.

All Foundries Need a Safety Program

BY M. F. GARTLAND

IF WE could operate a foundry by machinery without the touch of a human hand we should have no foundry accidents. But we can't do that, we must have men. We are making our product from pig iron and scrap. To put it on the market men must unload the iron, the coal, and the sand. They must charge the furnaces and heave in the coal to heat them. Other men must draw off the molten charge and pour it into the molds, and still other men must dump the castings from the molds and follow them step by step through the finishing processes and then put them on board the cars for their destination. In each of these operations there is a certain element of danger from the very nature of the materials and because of the fact that human hands must direct each one of them. This element of danger or hazard can be lessened but never eliminated by modern machinery.

We have three elements of hazard with which to contend even in the best of our foundries: equipment, product, and men. The safety engineer and the foundry expert have done a great deal to eliminate the danger in the manufacturing process and they will yet do a great deal more. The greatest hazard yet remains and here is a job for the human engineer.

It is the purpose of this paper to direct attention to certain phases of the work of the human engineer. For the sake of clearness the subject will be presented as though his work were to be entirely divorced from that of the safety engineer. It will be so presented but with full knowledge of the fact that the two types of work are very closely related to each other.

Owners and managers are beginning to recognize the human element that enters into their safety problem and they are all striking out, some of them blindly, perhaps, to find its solution. We have housing plans. We have gardens by the thousands for our employes. We have clubs and classes. We have entertainments and socials. We have free clinics and visiting nurses and social service workers. We have bonus systems and plans of profit sharing and a score of other lines of welfare work all trying for the one goal of making the worker a more efficient and better satisfied man.

We know that everything we do in our leisure time has its effect upon our lives while we are at work. The thing that is true of the executive who works in ideal surroundings is still more true of the man who labors with his hands and earns his living in the heat and smoke and confusion of our foundries. To a very large extent he is made or unmade by the things which happen to him outside of his work-day life. So then we may say that a divorce suit in a local court may be more dangerous to the man involved than an open pit near his work bench. A threatening landlord may produce more injuries in our foundry than our worst hazard of equipment.

Now let us look at some of these men of ours who are so prone to injury. First there is the man who is a misfit. There are men in all of our foundries who ought not to be there. They have been drawn into our employ through a chain of circumstances and it is hard for them to break away. Not having interest in their work they lack the incentive to become efficient workmen. They drag through the day without enthusiasm and leave when the whistle blows with a full quota of accidents piled up behind them.

The easiest thing would be to give such a man the opportunity to find work somewhere else. We would have done that in the old days but

Abstract of paper presented at the eighth annual congress of the National Safety Council held in Cleveland Oct. 1 to 4 by M. F. Gartland, Marion Gray Iron Foundry, Marion, Ind.

we hesitate to do it now; not that we love the man any more than we did but it is not so easy to replace him with a better man. Another and better solution is to give him his opportunity in some other part of our own plant if possible. We know this plan will work because we can all call up a great number of individual cases where it has worked. It will make careful and efficient workmen out of a great many of our accident makers and will often be the means of keeping a valuable man on our payroll. Each case must be handled in its own way. Some men respond much more quickly than others, and we cannot say that the principle will work in every case because we know it won't. There are some men who are misfits no matter where you place them.

The next man who is a great maker of accidents is the man whose mind is ill at ease. He may be, under ordinary conditions, a very careful and loyal workman but when troubles fall upon him he loses his sense of proportions and all thought of safety for himself or others is crowded out of his mind. When we meet with a case of this kind we must have a specific remedy. A prescription of the "shot gun variety" has no value to this man. His own personal problems must be met and solved. Every plant needs a squad of sharpshooters who can hit the spot every time. Call them what you will; visiting nurses, social service workers or what not but first find your men and women who have common sense and good judgment and then turn them loose with authority enough to ride over every precedent and break every rule of the plant if necessary to supply the one and only remedy for the worker who is in trouble.

Troublesome cases for which real remedies have been found and applied are real business assets. Cases will be found where it will be impossible even to establish a friendly relation. It will be more than impossible to be of help but the effort, if honestly made, will not be lost entirely. On the other hand we shall find that the help we *are* able to give is, in many cases, a real Godsend to their lives.

Nearly all of us are careless to a certain degree but we find men in all walks of life who are dangerously and criminally careless. If such men bore the complete result of their own folly we might well say "Good enough for them" but they don't. The innocent must always suffer with the guilty and the careless man is more dangerous to his companions than he is to himself. The fortunate thing about the careless man is that we *can* educate him both as an individual and en masse. It should be said, however, that he probably will not rise to this new degree of efficiency on his own account, but that he may be led into it after a heart-to-heart talk with some member of the executive staff. After all the safety meeting and the safety bulletin very often fail because most of us are prone to think that a safety message is a fine thing—for the other fellow.

As we shall find some misfits who cannot be "fitted" and some personal problems we cannot solve so we shall find some careless men we cannot cure.

There are two other elements in a safety program which are closely related. The first of these is environment. A building so constructed that men can constantly watch the street outside is a menace to the safety of the plant. When men watch the street they do not watch their work and nothing is more productive of injury. We should have our buildings well lighted, but the light should come from windows well above the level of the average workman's eyes.

The second thing which should have special mention here is that of proper instruction for the man newly hired. This is a more personal matter than that of environment. A man may be a good workman even a master of his trade but if he does not know *our* methods of doing work in *our* foundry he may cause any number of accidents to himself and others before he learns.

What the man needs is a comprehensive view of the whole organization. The task of giving him this information should be assigned to a definite group of qualified men and the new man's acknowledgment of having received such instruction should be made a part of his employment record.

Foundry Exhibition Surpasses All

(*Concluded from page* 734)

about the plant, and C. E. Knoeppel & Co., experts in the solution production problems.

Exhibitors who were known personally to almost every foundryman who visited the show were: The Foundry Equipment Co., Cleveland; Young Brothers Co., Detroit; T. P. Kelly & Co., New York; the Malleable Iron Fittings Co., Branford, Conn.; the Lindsay Chaplet & Mfg. Co., Philadelphia, and the J. S. McCormick Co., Philadelphia. The latter displayed a new type pneumatic blacking mixer for spraying facings.

In the number of tools displayed and in the diversity of work actually performed during the week, this year's exhibition of metal working machinery surpassed all previous foundry shows and undoubtedly equaled any exposition of its kind ever held in this country. More machines were shown in operation than in past years, principally because of the fact that an unprecedented proportion of them were motor driven. Remote control and other special electrical accessories appeared more prominently than ever before, and reflected unmistakably the growing popularity of this kind of equipment. Machine tools representing more than 20 manufacturers were displayed by their Philadelphia sales agents including the Vandyke-Churchill Co., the Monarch Machinery Co., and the Swind Machinery Co., Philadelphia.

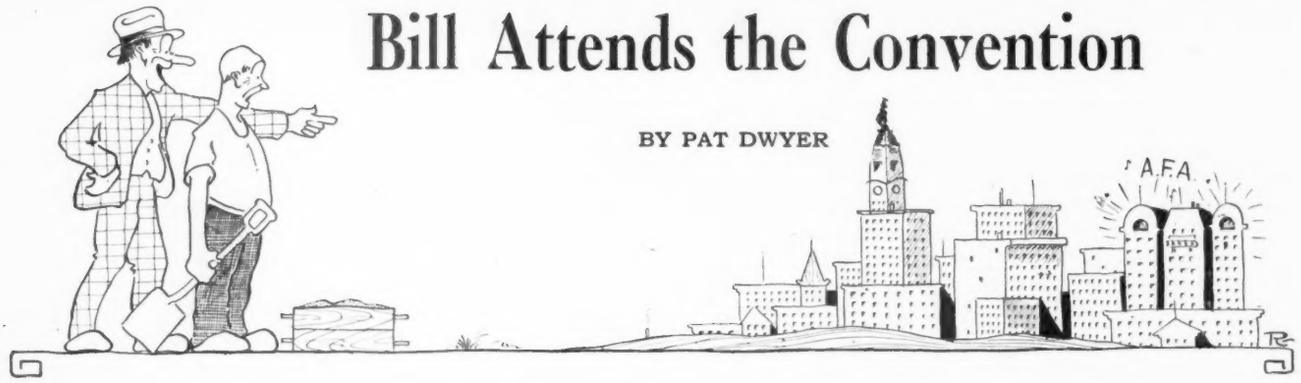
One of the most interesting tools at the exhibition was the 8-inch automatic vertical boring mill demonstrated by the Bullard Machine Tool Co., Bridgeport, Conn. Gear blanks, involving six distinct machining operations, were finished on this machine. Another tool which attracted attention was the tool grinder displayed by Alfred Herbert, Ltd., New York, which formed high speed steel lathe, planer and shaper tools from bar stock without forging. Among the grinding machines exhibited by the Heald Machine Co., Worcester, Mass., was a small internal grinder which never had been exhibted before. Among the other manufacturers whose machines embodied many of the automatic features recently developed to meet the requirements of quantity production were the Warner & Swasey Co., Cleveland, and the Norton Co., Worcester, Mass.

Among the manufacturers who had attractive displays of saws and metal cutting machines were E. C. Atkins & Co., Indianapolis; the Black Diamond Saw & Machine Co., Natick, Mass.; Henry Disston & Sons, Philadelphia; the Napier Saw Works, Inc., Springfield, Mass.; the Simonds Mfg. Co., Fitchburg, Mass., and the Racine Tool & Machine Co., Racine, Wis.

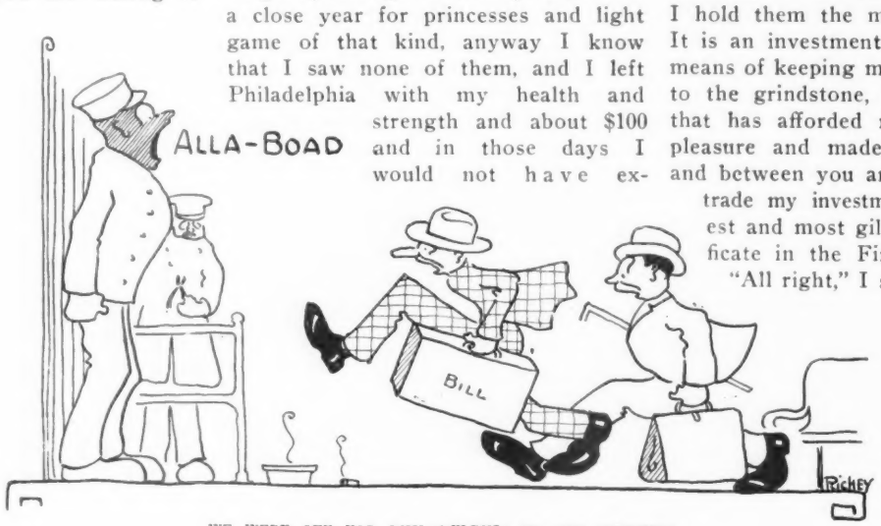
Most woodworking machines, particularly the bench planers and saws, were equipped with safety devices which, in general, indicated a vast improvement over the corresponding equipment displayed in previous shows. The popularity of direct motor drive was again demonstrated, and some of the smaller machines were designed for operation from an ordinary electric lamp socket. Among the companies exhibiting wood working machinery were the American Wood Working Machinery Co., Rochester, N. Y.; Charles H. Besley & Co., Chicago; Gardner Machine Co., Beloit, Wis.; Oliver Machinery Co., Grand Rapids, Mich., and J. D. Wallace & Co., Chicago.

Bill Attends the Convention

BY PAT DWYER



SAY, said Bill to me one night, "I suppose you are all set for this convention thing down in Philly?" "Well," I said, "I don't know whether I can get away or not." "Where do you get that stuff, can't get away?" said he. "Do you mean the boss won't let you off or are you afraid the work will fall down while you are away? How do you suppose the world ran before you were born, or how do you suppose it will run after you're dead? I suppose you are willing to admit, if only for the sake of argument, that you will probably die sometime?" I told him that the question of dying had no bearing whatever on the subject, furthermore I was a modest man and therefore I could assure him that the other reasons he had advanced were just as wide of the mark. "Perhaps your trouble is," said he, "that you are afraid if you go the boss will find out that he can get along just as well without you and write and tell you that your resignation has been received and accepted with regret."



WE WERE OFF FOR PHILADELPHIA IN THE MORNING

He was in what the Scotch call "rare form" and I knew from experience that the only way to head him off was to ask him a direct question.

"Never mind," I said, "wasting your time discussing regrets and resignations and all the bunk that usually goes with them. Tell me one thing, are you going to the convention?"

"Sure," said he, "I have never missed one yet. They have been growing in importance every year and I certainly am not going to skip this one. Besides I have not been in Philadelphia for several years and I should like to give it the once over. I was young and care free the first time I was there and a halo of romance hung over everything. Willow Grove and Chestnut Hill and Washington Park down the Delaware were potential fairy lands were it was just possible princesses might be found straying down the leafy paths and weaving flowery garlands or whatever it is that princesses do to pass away the time.

"It may be that I did not search diligently enough or it may have been a close year for princesses and light game of that kind, anyway I know that I saw none of them, and I left Philadelphia with my health and strength and about $100 and in those days I would not have exchanged places with old John D. himself. For that matter I would not change with him now. There are some things he has that I would like to have but then again and vice versa I have some things that he has not and taking it by and large and on an average I would not trade with him. Would you?"

I said I did not know, John's job looked good to me. I had been just one jump ahead of the sheriff for so long that I would like to experience the feeling of financial independence for a while.

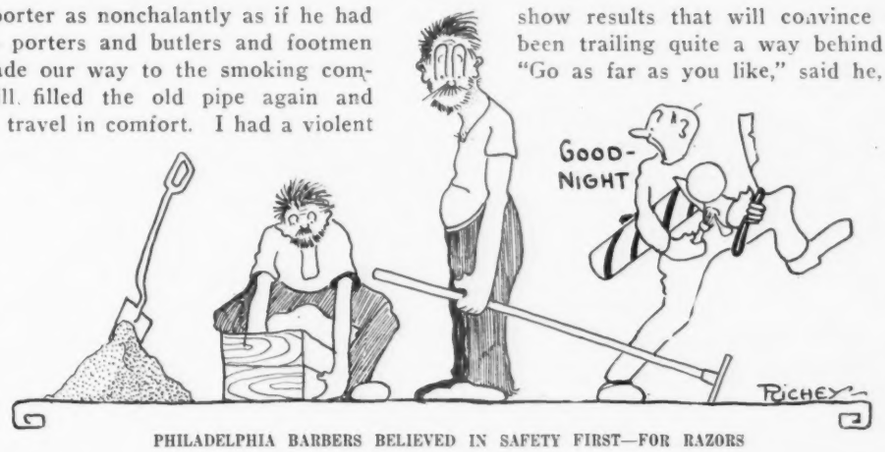
"Nothing to it," said Bill. "The less you own, the less you have to worry over. I knew a fellow one time who worried himself sick trying to buy a house and lot, after he had it nearly paid for he worried because he was afraid it might burn down and then just as he got it paid for he lost his hold on the string of life, and as they used to say in the Old Testament 'he died and was gathered to his fathers.' I know, for I was one of the pallbearers and helped put him away. Now look at me, I never owned anything. 'Tis true I have a half interest in several rather lively young specimens of the human race but they are something like the form of insurance policy which the government issued to the members of the A. E. F., the longer I hold them the more they cost me. It is an investment that has been the means of keeping my nose pretty close to the grindstone, but it is also one that has afforded me many years of pleasure and made life worth living and between you and me I would not trade my investment for the brightest and most gilt-edged stock certificate in the First National bank."

"All right," I said, "I am not very strong on this financial stuff; I'll take your word for it. I have to be on my way now but I'll let you know later whether I am going to inflict the pleasure of my company on you or not."

"All right," said he and went away whistling, "I'm off to Philadelphia in the morning."

I called Bill up later and told him that all the difficulties had been smoothed out and that I would meet him at the station next day. I found him pacing up and down the waiting room and carrying a black leather bag that showed evidence of much service. He was smoking the inevitable cob pipe but confessed that he had never yet smoked tobacco which could approach his first love, Montreal Twist. After a while the announcer called our train and we walked down the platform until we came to the car with one of those weird and wonderful names and the number corresponding to the one on our tickets. Bill handed

the old bag to the porter as nonchalantly as if he had been accustomed to porters and butlers and footmen all his life. We made our way to the smoking compartment where Bill filled the old pipe again and remarked, "I like to travel in comfort. I had a violent attack of wanderlust after I had finished serving my time and it required a change of air and scenery every few months for about five years to effect a cure. I was as free and independent as any molder who carried a card but I drew the line at riding on the brake rods, blind baggages, cabooses or side door pullmans. I have never been what you might call an ardent admirer of George Pullman, but I have done my bit in helping him and his heirs to gather up his millions."



PHILADELPHIA BARBERS BELIEVED IN SAFETY FIRST—FOR RAZORS

With the freedom which old acquaintance warranted, I asked Bill if he was financing the trip himself. "No," said he, "I am not, the boss regards this trip of mine every year as a legitimate expense, or as an investment if you care to put it that way. He knows from experience it is a form of investment which pays nice fat dividends. The first year I worked for him I put the proposition up to him when the convention time was drawing near. He was quite willing to let me go but balked at the idea of paying my expenses. I pointed out to him that any kinks or pointers I might pick up would be devoted to the furthering of his interests on my return. He could not see it that way at first so I made him a proposition to the effect that he should finance the trip and if on my return I did not introduce some wrinkle which would offset the price of the trip in three months he could stop the amount off my salary. 'Fair enough,' said he. 'Go to it.'

"That convention and exhibition were very small compared to the one we are going to see now, but I saw and heard enough there to convince me that we were only amateurs down our way. The first morning after my return the boss called me into the office to furnish a report. 'Well,' said he, 'shall I instruct the paymaster to stop that little bill off your salary all in one lump, or would you prefer to have it removed painlessly in small monthly installments?' 'It looks to me,' I said, 'that if you ever expect to go to heaven, you will not only cancel the bill but you will be instructing the paymaster to increase my stipend or honorarium each and every month.' 'Sounds interesting, Bill,' said he, 'but you will have to show me.' 'You may be from Missouri,' I said, 'but you won't need to put on any glasses to see this proposition.'

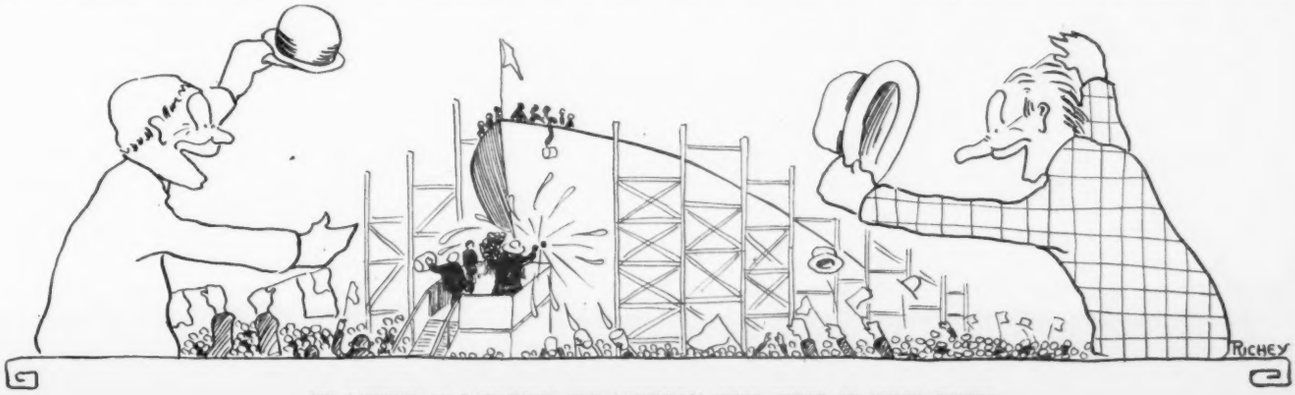
Behind the Band-Wagon

"When I was through he said that some of the ideas were wild and impracticable, and in regard to the labor-saving equipment I had described, he frankly expressed the opinion that the makers had hypnotized me and he had no intention of filling his shop with a lot of high-faluting junk.

"Can you beat it? I'll say you can't."

"'All right,' I said, 'you are the boss and are paying the bills and therefore are entitled to the last word. I intend to institute some changes in our molding, melting and coreroom practice for a start and I expect to show results that will convince you that we have been trailing quite a way behind the band wagon." "Go as far as you like," said he, "that is what you are here for—to get results, but remember the results must be on the right side of the ledger." "I retired to my own private den and checked up some of the points I had picked up. Away from the glamour and glare and enthusiastic atmosphere of the convention some of them looked pretty radical, but I reflected that if one man could get away with them, another one might and I determined to try them out. Of course a considerable volume of water has flowed under London bridge since that time and many things which were considered remarkable then are now regarded as quite common place. I found that I could reduce the amount of pig iron, coke, new sand, both for molding and coremaking and also the amount of binder. I put on men at night to remove the castings and prepare the sand and a man by day to prepare all the facing sand. I met opposition, sure, there never was a change made yet but somebody opposed it; but I persisted, and the result at the end of the month not only surprised the old man—it surprised me. He called me into the office and said, 'You win, Bill, I am inclined to plunge a bit and order some of that equipment you saw at the convention.' He did that very little thing and when the next convention rolled around, we were both there in the front row."

We landed, successfully, in Philadelphia on Tuesday morning and registered at the same hotel. That was the last I saw of Bill except a fleeting glance now and again until I met him in the Broad Street station at 7 o'clock Friday night. We found seats together and he asked me what I thought of the convention. I told



WE ASSISTED IN LAUNCHING THE AFOUNDRIA WITH THREE OF THOSE CHEERS

him that I had been astonished. I had not looked for anything on so extensive a scale.

"Leave it to the foundrymen," said he, "when they do things they do them right. I had *some* time, believe me; I met old friends, heard of others and met new ones. They were there from everywhere, some of their home towns were as far apart as those of the benighted human beings referred to so feelingly in the missionary hymn, 'From Greenland's Icy Mountains to India's Coral Strand.' In addition to representatives from all over the United States, they were there from Canada, from Australia and one Englishman particularly created a most favorable impression on all whom he met.

"The local committee deserve great praise," I said, "for the excellent manner in which everything was carried out."

"There was just one discordant note struck," said he, "but of course it may not have been intended as such." I said I had not noticed anything of that nature.

"Well," said he, "it's like this. In the early days of the industry, the foundrymen were as a rule husky, hairy men running largely to whiskers. They not only had the reputation of having sand in their make up but they also had the reputation of carrying a considerable amount around concealed in their flowing fringes. They were looked upon with sour disfavor by tonsorial artists in general. In fact a barber would just as soon shave a piece of sand-cast pig iron as some of these birds of a bygone day. I am making no charges, but don't you think a certain amount of significance attaches to the fact that the barbers of Philadelphia struck on the day the foundrymen's convention opened."

"I think your conclusions are rather far fetched," I said, "the next thing you will be claiming is that the A. F. A. and the A. O. H. are first cousins because De Valera was tendered a reception one night in the ball room of the Bellevue-Stratford where the A. F. A. held its daily sessions."

"You can't start any racial argument with me," said he, "because I know your sentiments. Let's talk about something else."

"Well," I said, "are you pleased with your trip?"

"Sure," said he, "I attended several sessions of the A. F. A. and heard interesting papers read and discussed. I went for a ride down the Delaware and saw Hog island with its 50 ways and a ship in each of them. They even launched one while we were there and I did my share in giving three of those cheers which showed our appreciation. I went out to the Commercial Museum and saw specimens and working exhibits of every conceivable thing used in a foundry except profanity and old clothes. I attended the banquet on Thursday night and heard examples of English, French and American oratory. They were all good, that is to say they were all major league performances; but for fluency, ease and beauty of diction I think Mr. Beck's batting average should be about 600. After I had seen and heard all there was to be seen and heard, I began to think of a certain lady and a bunch of assorted olive branches in the old home town and between you and me and the statue of William Penn, I don't mind admitting that the best thing I saw in Philadelphia was this little old 7 o'clock train homeward bound."

Arc Welding Makes Good in the Foundry

CONSIDERABLE savings may be effected by welding defective castings, is the opinion of Robert E. Kinkead, in a paper presented at the annual meeting of the American Foundrymen's association in Philadelphia, Sept. 29-Oct. 3. In describing methods of welding castings, the author calls attention to the fact that electric arc-welding has been used in steel foundries for about 10 years and during that period the sentiment toward salvaging defective castings has changed in a most remarkable manner. The repairing of defective castings by arc welding is said now to be standard foundry practice. The paper continues, in part, as follows:

Good foundry practice indicates that steel castings which have been welded by the carbon electrode process should subsequently be annealed to relieve any local internal strains which may have been introduced by the application of the heat of the arc. There are occasions, however, when it is extremely inconvenient and expensive to reanneal a casting which shows a slight defect. On such occasions the application of the metal electrode process, owing to the very great localization of the heat, will permit the correction of the defect without the necessity of reannealing.

Until recently $\frac{5}{32}$-inch diameter metal electrode was as large as was ordinarily used in this work. Investigations have recently shown that $\frac{1}{4}$-inch electrode, and even $\frac{3}{8}$-inch diameter rod, may be used in the metal electrode process to advantage on steel castings.

The welding of malleable iron castings is difficult. The most important application of the metal electrode welding process in malleable castings is in the plugging of sand holes in castings which are to hold oil. A large number of the weld. This practice will not bile work are of this nature. The welding on malleable iron is always done after the casting has been annealed. If the casting is to be machined at the point at which the weld is made it should be reannealed.

There are two classes of work which can be done in the gray iron foundry with the metal electrode process. In the first class are large castings which come from the sand with shrinkage cracks or low spots in parts of the castings which are not to be machined. In the case of a crack, it may be opened up with a chipping tool, and steel filled in to give a measure of strength and complete pressure tightness.

The welding can be handled with a low current, and should not be done continuously. The operator should weld for possibly 20 per cent of the time; the remainder of the time being divided up into intervals to permit the heat to be distributed throughout the locality of the weld. This practice will not harden the cast iron in the vicinity of the weld with the exception of the iron which is within $\frac{1}{16}$-inch of the line of fusion. The steel added will not be hardened by the absorption of carbon from the cast iron for a distance greater than $\frac{1}{16}$-inch from the line of fusion. If the welder works intermittently he will avoid having the steel shrink away from the gray iron. The difficulty in machining such a weld arises from the hard area $\frac{1}{16}$-inch on either side of the weld.

The second class of work which can be done with the electric arc on gray iron is in the correction of small sand holes and sand spots on surfaces which are to be machined. In work of this nature the sand hole is opened up and a nickel electrode fused into the hole by the heat of the arc. The nickel is not welded to the cast iron, but at the high temperature produced by the arc makes an intimate contact with the gray iron, which resembles an amalgamation. The nickel is then peened and the excess metal filed away. The job may be made pressure tight, and the application is entirely successful in the correction of sand spots in the bore of engine or pump cylinders. This process is not used for the repair of breaks in a casting, but is merely a method of plugging a crack or sand hole. It is not recommended where the line of fusion is subject to strain.

Radiators Made on Double Stripper

The Machine, Which is Self Propelled, Makes Cope and Drag at One Operation—A Series of Pins Working Through Holes in the Patterns Prevent the Chaplets From Sticking

AN INTERESTING new combination jar-ram, squeezer and stripping-plate molding machine has been developed by the Cleveland-Osborn Mfg. Co., Cleveland, for making both cope and drag molds at one operation. This machine, which is adapted to a wide range of work, was shown for the first time at the American Foundrymen's convention and exhibition in Philadelphia, where it was fitted with pattern-plates for making radiator sections. It is an adaptation of a machine originally built for making rear axle housings at the plant of the Saginaw Malleable Castings Co., Saginaw, Mich. All the essential features of the machine with the exception of the pins used for maintaining the chaplets in their correct positions are clearly shown in the accompanying illustrations.

The machine is self-propelled and has been designed to travel on a narrow-gage track parallel to the sand heap and to lay down a long single row of molds. The track may also be laid across a number of sand heaps and a number of molds laid down on each floor before the machine moves on to the next. It is provided with an air motor, *A*, Fig. 1, at the back of the main frame which enables it to travel under its own power. Where the range of travel is limited, a single length of air hose will furnish sufficient flexibility; but in cases where the machine is called upon to cover a great many floors, it is recommended that a 2-inch galvanized wrought iron pipe be laid alongside the back rail of the track, with quick-acting connections at intervals of about eight feet, or one to each floor.

Some Construction Details

The main frame and cylinders of the machine are cast integrally and the whole is mounted on four wheels running in ball bearings. Means of lubricating each wheel is provided so that the machine may be moved at all times with a minimum of power. In fact simplicity and ease of operation were among the principal aims of the designers of this machine.

A pair of machined 6 x 1-inch steel bars, to which attention is directed by *C*, Fig. 1, are attached to the frame, one at each end. The overhanging ends are supported and held parallel and in line by a pair of cast-iron brackets shown in the same illustration.

As may be seen by consulting Figs. 1 and 4, the frame which carries the squeezer head moves back and forth on this pair of slides. This frame is of rigid construction and is mounted on four wheels which in turn are provided with roller bearings. Therefore but little effort on the part of the operator is required to move the head back and forth. The construction of the head and the means adopted for regulating the position of the pattern-plate to accommodate any depth of flask are clearly shown in Fig. 3. The steel I-beams carrying the head are held together at each end by cast-iron distance pieces which in turn function on substantial threaded rods or guides. By means of lock nuts, the distance pieces can be held in any position between the top and bottom of the rods. The I-beams support on their lower side a light rectangular plate which is rendered stiff and strong by external flange and a series of longitudinal and transverse ribs.

This plate is not brought into contact with the sand in the flask. A strong, thick wooden board is used for that purpose. The upper side of the board is provided with three battens which are attached to the iron plate just referred to. A number of pads which come into intimate contact with the sand are attached to the lower side of the board.

Instead of letting the board go perfectly flat these pads are provided on account of the transverse bars in the flasks. The spaces between the pads correspond to the positions of the bars.

The air supply is centralized in the column *E*, Fig. 4. All the movements of the machine with the exception of traveling along the track are directed by the operator while standing near this column.

The cylinder for actuating the pattern stripping mechanism is shown at *B* Fig. 1, and at Fig. 2 may be seen the lever and shaft through which the force is transmitted.

Long stemmed chaplets bearing square

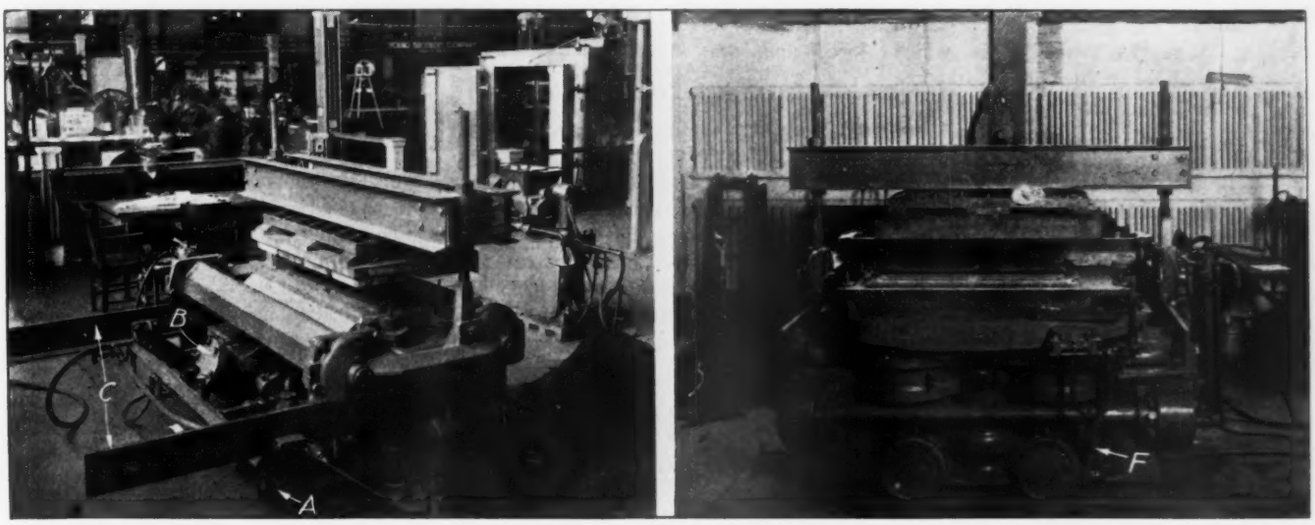


FIG. 1—SQUEEZER HEAD MOVED FORWARD TO PERMIT A CLEAR VIEW OF THE BACK CONSTRUCTION. FIG. 2—FRONT OF MACHINE SHOWING LEVER WHICH ACTUATES THE STRIPPING MECHANISM

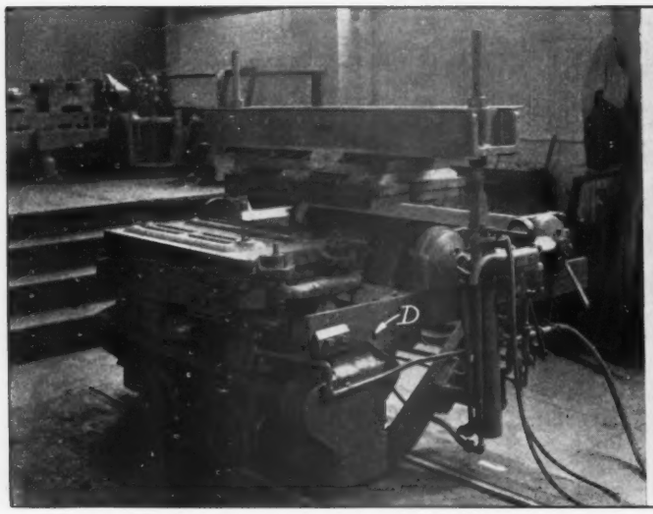


FIG. 3—THE MACHINE WILL NOT FUNCTION UNTIL A CATCH ON THE HEAD ENGAGES THE SLOT *D*

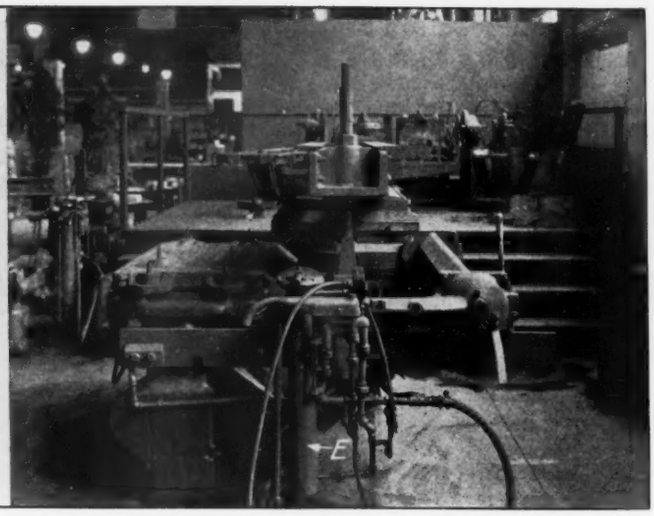


FIG. 4—CONTROL OF ALL MOTIONS EXCEPT TRAVELING IS CENTERED IN THE COLUMN *E*

heads are used as in ordinary radiator molding practice. There are holes through the patterns at the points where the chaplets are to be placed. Immediately below each hole a pin, which is made a loose sliding fit, is attached to a projection on the under surface of the stripping plate. The lower ends of these pins are threaded and by the aid of a pair of lock nuts they may be adjusted to any height within their limitations. Their relative height determines the thickness of metal in the proposed casting. Again, when the mold has been rammed, the stripping-plate lifts the flasks off the patterns and at the same time causes these pins to follow the chaplets up through the holes. Thus is discounted any possibility of the chaplets sticking in the pattern and therefore being loose in the mold.

Operating the Machine

When in use, the squeezer head is pushed back to the position shown in Figs. 2, 3 and 4. The cope and drag are placed on the pattern plate and a wooden frame 4 inches in height is placed on top to hold a surplus of sand. When the flasks have been filled with sand the valve controlling the jarring mechanism is opened and the mold rammed to a predetermined density. The wooden frame is then removed and the squeezer head brought forward. A thin iron straight edge, *H*, Fig. 2, precedes the squeezer board and provides a perfectly even surface for the pads to press against. The squeezer head automatically adjusts itself to the position of the flask by means of a catch which engages the slot *D* Fig. 3. The table is then raised and the sand squeezed. It is next lowered back to its original position, the vibrator set in motion and the flasks stripped from the patterns. Two men lift the flasks off the machine and set them on the floor.

How Loam Molds and Cores are Dried

BY ERNEST SCHWARTZ

WELL dried loam or dry sand is essential in making castings that are to be free from scabs. Some irregularity is admissible in mixing the loam or blacking, but the mold should be thoroughly dried. When the water in a damp mold is heated, it is converted into steam and the latter, when confined, creates pressure. Iron, when poured into a mold, heats the surface and interior portions, and this heat generates steam if moisture is present; a mold rarely is strong enough or close enough to hold the pressure which increases until it forces an opening through which to escape. It may seek an exit through the mold in the direction of the flask, but it is more likely to seek an outlet through the iron. The mold generally is encased by an iron flask, or held by curbing and between this and the brickwork, sand is rammed hard and compact. Except through a few vent holes, it is almost impossible for the steam to escape in this direction. Toward the face of the mold the brickwork is open, or if it is a dry sand mold, the surface generally is more porous than the backing, so that the steam generally will escape, or will be drawn through the surface of a mold before it will find its way through the outside. This is the main reason why a damp mold will cause a casting to scab.

The surface of a loam or dry sand mold generally is hard and close, whereas that of a green sand mold is porous, thereby permitting the steam generated at the surface of the mold to escape through the sand until it is free; but if the green sand is rammed too hard, then the steam cannot force its way through the sand and the steam will pass up through the surface of the mold and through the liquid iron, thereby producing a scabby casting. A green sand mold that is rammed too hard and a loam or dry sand mold insufficiently dried, have a similar effect on the casting.

Whether a loam mold is dry frequently is a matter of guesswork. It is not the length of time a mold has been in the oven, nor its appearance that indicates its degree of dryness. A mold that should be dried in two or three nights often is only half-dried, as the oven may not work well, or the attendant may have neglected the fires. The fire may have been very hot for a short time, thereby scorching or burning the surface of the mold and the interior may not be in a dry condition.

Considerable skill is required in operating a fire to dry a mold properly. At first the fire should be slow to prevent blistering or cracking the surface of the mold, which is caused by the generated steam seeking an outlet. The steam meeting with the resistance of the half-dried blacking, which is elastic, stretches and raises the coating of blacking, but it has insufficient pressure to force its way through and escape. Some foundrymen believe that they save fuel by keeping a slow fire to dry molds or cores. In some cases this may be so, particularly when a mold is of limited mass, so that one night's firing will dry it; but when a mold is massive, after the

first easy firing, more fuel will be saved by keeping a steady fire than with a slow fire. The latter will cause the heat to penetrate about 8 inches, after which further drying will be slow.

With some molds or cores this slow firing might be kept up for a week, and still the interior would not be dry. On the other hand, if the fire had been hotter, the heat would have penetrated the interior and the steam and moisture would have been expelled with probably two-thirds less fuel.

When making large molds or cores, openings should be provided, if possible, from the center to the outside, to assist the steam to escape from the interior; also, the center should be filled with coke or cinders, whenever these can be used. Sufficient vents in molds or cores also are a great aid in drying.

It is difficult to ascertain whether a loam mold has been sufficiently dried for use. For the purpose of ascertaining whether a loam mold has been dried, the molder should provide an opening in the bottom of the mold, that will permit of inserting a wet brick, or a lump of wet loam; the outside of this opening could be closed with temporary brickwork and mud. When the molder thinks the mold is dry, he can pull out the temporary brickwork and note the condition of the inserted brick or lump of loam. If this part of the mold is at a distance from the fire, and the brick or loam is dry when broken, he generally is certain that the mold is dry.

Figs. 1 and 2 illustrate some methods of drying loam molds that are too large to be dried in the ovens or too heavy for the crane to lift, making it necessary that they be dried in a pit or on the shop floor; *B*, Fig. 1, as a fire basket, sometimes built in the form of a open grate, as shown at *P*; also, it may be built of boiler plate, drilled full of holes. For the bottom grate bars in both styles, wrought iron rods generally are used.

The baskets are round or square, according to the form of the molds in which they are to be used. Their width and height will depend upon the dimensions of the mold. There should be at least 18 inches space between the surface of the mold and the fire basket to prevent burning the surface of the mold before it is thoroughly dried. Sometimes, instead of one large basket, three or four smaller ones are used to distribute the heat with more uniformity. When the mold has a bottom, like the one shown, the baskets generally are suspended by a hook supported by a strong bar. When a mold has no bottom surface, the basket may be provided with a bottom bearing. For molds of this class, it is best, when possible, to raise them sufficiently so that the bottom of the mold is about on a level with the top of the fire basket; or a hole may be dug underneath the mold to effect bottom drying.

Building a Temporary Fireplace

When the inside of a mold is too small to admit a fire basket, a temporary fireplace is built adjacent to the bottom of the mold, and the heat is directed through the middle of the mold, by closing the outer opening with brickwork or sand, as shown at *S*, Fig. 2. The fireplace, *H*, Fig. 2, can be built in the form of a basket and can be placed directly underneath the mold or core. This basket can be pulled out to clean and renew the fire, or a temporary fireplace can be provided, as shown at *W*, Fig. 1, built-up outside of the core or mold, the heat being conducted through a flue to the inside of the mold.

To confine the heat, the molds generally are covered with sheet iron or boiler plates, as shown at *Y*, Figs. 1 and 2; *D*, is a stove pipe provided to carry off the smoke and steam and to create a draft; *E*, Fig. 1, is a sheet iron curbing for retaining the heat; *X* is a brick wall for the same purpose. Either the wall or the curbing will answer the purpose.

The combined fires are needed only when a wall over 8 inches in thickness is to be dried. In this case a fire in *W*, to heat the inside of the mold, is combined with a fire on the inside of the mold, and flues, *1*, *2*, *3* and *4*, are connected with the fire *W*, to direct the heat underneath the bottom plate which should have plenty of holes in it. The two fires thus combined will thoroughly dry a mold. The flues can be made with brick, or rough gutters can be cut in the sand, either of which, if desired, can be filled with sand after the mold is dried. The heat also could be directed underneath the bottom by having the bottom plate raised on iron blocks, as shown at *AA*, Fig. 2.

A pipe, *T*, Fig. 2, leads to the outside of the mold to admit air to the pit, creating a draft. With a fire basket lowered down through the mold into the pit, we should have a fire below the bottom of the mold, as shown at *H*, Fig. 2. After the mold has been thoroughly dried by the fire baskets,

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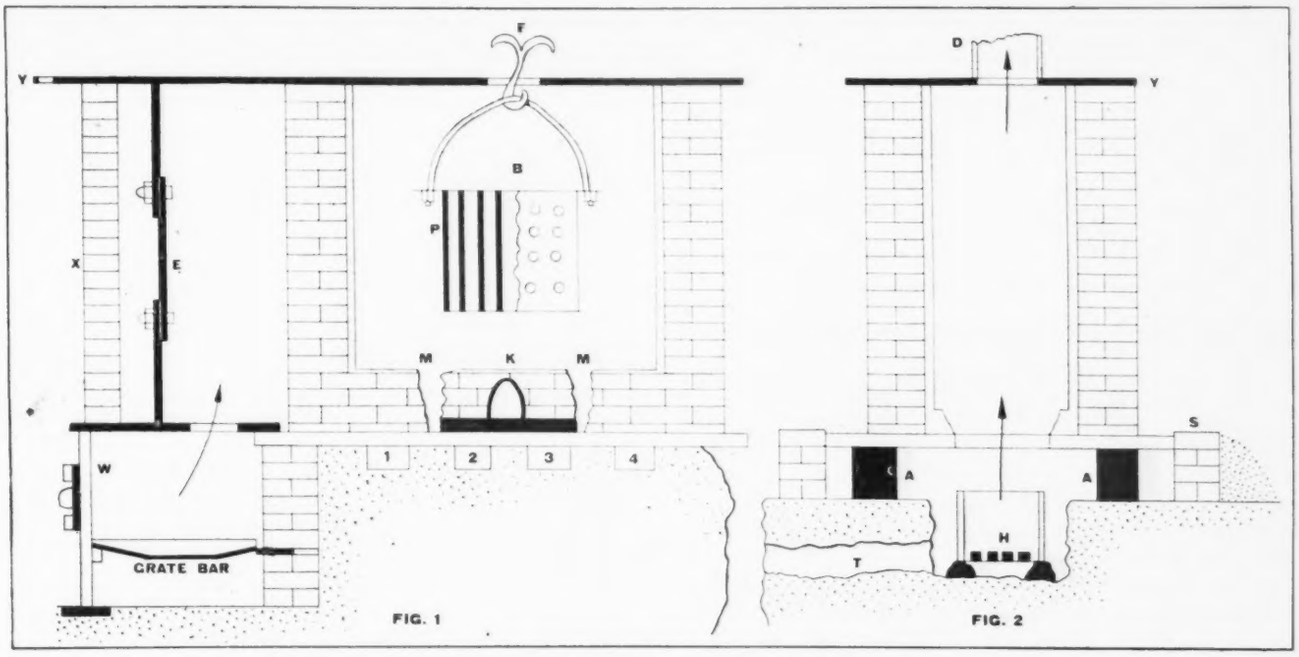

FIGS. 1 AND 2—SECTIONS OF LARGE LOAM MOLDS SHOWING VARIOUS METHODS OF DRYING

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Contents

	Page
Foundry Convention Huge Success	717
Melting Methods and Costs Compared	722
Malleable Men Discuss Big Problems	724
Education Is Cure For Industrial Ills	725
Foundry Exhibition Surpasses All	727
System is a Factor in Production	735
Castings for Ship Construction—XII	738
Expand Furnace Company	741
Electric Furnace Men Meet to Form Association	741
Following Work Through the Plant	742
Facing Sands for Use in Steel Casting	743
Institute Presents Varied Program	744
Brass Questions	745
Stamp Seal Metals	745
Pickling Brass Castings	745
Pitch Repelling Metal	745
Holding Lead in Copper	745
Molding Defects Cause Trouble	745
Acid Resisting Bronzes	746
Wire Cloth Scrap	746
Crucible Melting of Monel Metal	746
Cheap Tablet Mixtures	746
Experts Consider Safety Methods	747
All Foundries Need a Safety Program	748
Bill Attends the Convention	750
Arc Welding Makes Good in the Foundry	752
Radiators Made on Double Stripper	753
How Loam Molds and Cores are Dried	754
Without Precedent	756
Co-operation That Counts	756
Trade Outlook in the Foundry Industry	757
Comings and Goings of Foundrymen	758
Induction Motor Starter	759
Operation of Pneumatic Tools Shown	759
Talks on Tractors	759
What the Foundries are Doing	759
New Trade Publications	760

Without Precedent

IT HAS almost become customary, in reviewing each succeeding foundry convention and exhibition, to state that it eclipsed all previous efforts and that its proceedings were without precedent in the annals of the industry. These remarks certainly could be applied with truthfulness to the twenty-fourth annual meeting which closed in Philadelphia, Friday, Oct. 3. In fact, the 1919 convention took action along some lines which were totally unexpected and precedents were smashed in reality as well as figuratively. For the first time in its history the American Foundrymen's association has gone on record in a labor controversy. Its action in this regard was, however, with the unanimous consent of all of the members present at the meeting, it being felt that the steel strike, concerning which action was taken, is of such transcendent importance that the association could afford to deviate temporarily from its established policy of not interfering in any way in labor problems. It is believed that every one who reads the strong but temperate communication addressed to the members of the senate committee on education and labor, which appears in full on page 723 in this issue, will agree that the American Foundrymen's association has taken a constructive position. The steel strike is indeed more than an ordinary labor disturbance; it has assumed a social and poltical importance which cannot be overlooked. That alien influences and principles have been allowed to become dominant in this strike is deplorable; that they must be extirpated vigorously and promptly all wise and just men will agree.

Co-operation That Counts

MANY foundrymen are familiar with the fact that a large amount of labor-saving machinery, purchased at considerable expense, is discarded or else operated inefficiently because the purchaser is either unable or unwilling to get the results out of his investment to which he is entitled. In neglected corners of too many shops can be found perfectly good machines that ought to be out on the floor earning money for their owners. In the past, the manufacturers of foundry equipment have contributed to this condition, to a degree at least, through their representatives who have in some cases been only too willing to knock their competitors' products, recommending tacitly if not actually that practically everything except their own equipment be relegated to the scrap heap. Such sales policies, however, injure not only manufacturers of foundry equipment but the foundry industry in general and the work which the Foundry Equipment Manufacturers association is doing to place the entire equipment business on a broader basis is therefore encouraging. The policies of this association, if carried out, cannot fail to benefit the entire castings industry. The association recommends the inauguration of a system of reports covering equipment which is not being operated satisfactorily, regardless of the name of the manufacturer, in order that steps may be taken to assist the owners to get full value from their apparatus. This kind of business policy has been termed "enlightened selfishness"—at all events it is effective in its beneficial results to all concerned.

Trade Outlook in the Foundry Industry

UP TO and including what seems to be the closing phase of the steel strike, foundries apparently are affected only in a minor degree. Both the source of raw materials and the destination of finished products of castings plants were particularly vulnerable to the attack as outlined at the start of the strike. The scope of the strike as planned embraced both blast furnaces and coke plants. Further, large manufacturing plants buying castings to enter into machines in which steel products play a vital part were threatened through the probable stoppage of steel supplies. In this event casting orders would likely have been suspended. It is apparent that neither of these factors have up to the present seriously restricted foundry operations.

Iron Not Scarce

From all sections of the country, gray-iron foundries report that existing pig iron stocks are ample for work on hand. Some, however, are apprehensive where special grades are required. This is true in particular of foundries producing automobile cylinders in the region including northern Ohio, Michigan, Indiana and Illinois. It is necessary to use an extremely low-phosphorus, high-silicon iron termed by some a "malleable-bessemer" grade. This has been made especially by merchant furnaces in this district, some of which at the present time are banked. Most automobile foundries, however, are stocked for several months' probable needs. The only contingency which threatens the makers of automobile castings is the serious probability that shortage of steel may restrict production and cut off the demand for all other needed materials. Stove shops have ample iron to enable them to operate until the first of the year if such a need should arise; but here again the shortage of sheets and fabricated steel parts might cause difficulty. Jobbing foundries have iron sufficient for two months at least and many are supplied well into the first of the year. Those which are not supplied are finding no difficulty in securing southern iron, and many northern furnace grades are attainable both direct from those furnaces which are operating and on resale from sources which are overstocked.

Prices of Raw Materials for Foundry Use

CORRECTED TO OCT. 11

Iron			Scrap	
No. 2 Foundry, Valley	$26.75 to 27.25		Heavy melting steel, Valley	$19.50 to 20.00
No. 2 Southern, Birmingham	27.50		Heavy melting steel, Pittsburgh	20.00 to 20.50
No. 2 Foundry, Chicago	26.75		Heavy melting steel, Chicago	18.50 to 19.00
No. 2 Foundry, Philadelphia	30.10 to 31.10		Stove plate, Chicago	23.50 to 24.00
Basic, Valley	25.75		No. 1 cast, Chicago	25.50 to 26.50
Malleable, Chicago	27.25		No. 1 cast, Philadelphia	25.50 to 26.00
Malleable, Buffalo	27.25 to 29.00		No. 1 cast, Birmingham	24.00 to 25.00
Coke			Car wheels, iron, Pittsburgh	24.00 to 24.50
Connellsville foundry coke	6.00 to 6.50		Car wheels, iron, Chicago	22.50 to 23.00
Wise county foundry coke	7.00 to 7.50		Railroad malleable, Chicago	20.50 to 21.00
			Agricultural malleable, Chicago	20.50 to 21.00

September's Figures

One week out of the month of September showed the influence of the strike upon merchant pig iron production, but even with this hampering influence the total production was greater than that recorded for August. The total merchant iron production for September was 576,105 tons as compared to 548,425 tons for August. This is a gain of 27,680 tons for the month; or on a daily basis, 1512 tons more iron per day were produced by merchant furnaces during September than during August. There are 185 merchant furnaces in the United States. Of this number, many of course are not in blast, but during September even under restriction of the strike only 17 stacks were banked or blown out and seven were blown in. While the figures of production may not be a true indication, due to the fact that the strike came at the close of an exceptionally productive month, it is evident from the comparatively small shrinkage in merchant furnace capacity that no immediate fear of iron shortage need trouble the foundryman. Exceptions may be made, of course, in cases where special grades will be required, and also where cancellation may force reordering for immediate needs from furnaces already booked to capacity.

Direct Effect Lacking

Except where foundries were an intimate part of steel plants, little effect was felt from the steel strike disturbance upon the foundry employes. Comment in the public print indicated that closure of foundries would follow closely on the heels of the strike. Through the Pittsburgh district many felt a lack of men for a few days, and some were crippled, but none was obliged to close down completely. The steel foundries were more seriously affected than either gray-iron, malleable or nonferrous shops. The district around Pittsburgh was practically untouched, but within the city some isolated instances of striking by cranemen, machinists or laborers brought suspensions for short periods. Foundries near steel mills were affected in some cases for a few days, but almost without exception the men have returned and the foundries are running full. In the East no effect whatever was noted, and around Chicago foundries have escaped unscathed through the three weeks' strife. A marked influence on scrap sales and prices has resulted from the steel troubles. In most centers, scrap trading is at a standstill. It was stated in some quarters that a strengthening in cast scrap prices was to be expected to follow a shortage in foundry pig iron, but neither of these eventualities has resulted.

Orders Increase

No slackening is apparent in the steadily growing demand for practically all classes of castings. Price cutting which was apprehended some eight weeks ago in the East has entirely disappeared giving indication that the eastern market for castings is firmer. Steel foundries still remain the least favored, particularly those which are dependent upon the nonappearing railway equipment buying. Nonferrous prices, always dependent upon iron and steel, remain strong. Prices on nonferrous materials based on New York follow: Copper, 21.00 to 21.50c; lead, 6.25c; tin, 54.25c; antimony, 8.50c; aluminum, No. 12 alloy, producers price 31.50c, and open market, 29.00 to 30.50c. Zinc is quoted at 7.45c, St. Louis.

Comings and Goings of Foundrymen

JOHN R. HYDE, vice president of the Sheffield branch of the British Foundrymen's association, was a guest of the American Foundrymen's association at the Philadelphia convention. Mr. Hyde, who represents the most progressive element in British foundry practice, is a junior member of the firm of Robert Hyde & Son, Ltd., which operates the Abbeydale foundry, Woodseats, Sheffield, and another shop at Chesterfield, England. This company specializes in railway work, particularly axle boxes and bearings.

Elihu M. Harriger has accepted a position as foundry foreman with the Gilmore Marine Motor Co., iron, brass and aluminum foundry, Detroit.

D. R. Scholes resigned recently as second vice president of the Illinois Malleable Iron Co., Chicago, to become connected with the Aeromotor Co.

Wiley T. Rabun, formerly with the Carolina Machinery Co., Inc., Asheville, N. C., has accepted a position with the Brenneis Mfg. Co., Oxnard, Cal.

Alvin H. Klemme, secretary of the Eagle Foundry Co., Belleville, Ill., has resigned to become factory manager of the Remmert Mfg. Co., of that city.

Charles J. Siegle, formerly with the Adamson Machine Co., Akron, O., has been made general foundry foreman for the Detroit Steel Casting Co., Detroit.

Fred S. Campbell has resigned as foundry superintendent for the Hitchings Co., Elizabeth, N. J., to take charge of the foundry of the Turner Machine Co., Danbury, Conn.

George J. Webster, general manager of the Charcoal Iron Co. of America, Detroit, has resigned, and has been made a member of the board of directors of the same company.

Charles G. Shaffer, who resigned his position as superintendent of the Singer Co., Elizabeth, N. J., has been made superintendent of the Gillespie Foundry Co., Inc., Paterson, N. J.

Stephen A. Douglas, vice president and general manager of the Wilson Welder & Metals Co., New York, has been transferred to the New York office to take the position formerly filled by R. S. Drummond, who recently resigned. Mr. Douglass will continue his Cleveland and Detroit offices and will spend part of his time in Detroit.

John P. Elton, treasurer of the American Brass Co., Waterbury, Conn., has been elected president of the Dime Savings bank of that city, succeeding H. H. Peck, who died recently.

Frank J. Lanahan, president of the Fort Pitt Malleable Iron Co., Pittsburgh, has been nominated to serve as first vice president of the

JOHN R. HYDE

Railway club, of Pittsburgh, for 1919-20.

Thomas Boyd resigned as superintendent of the Medina Iron & Brass Co., Medina, N. Y., to become manager of the Crescent Foundry Co., Rochester, N. Y. Mr. Boyd assumed his new duties on Oct. 1.

W. H. Roesner formerly with the Hart-Parr Co., Charles City, Ia., and more recently with the Superior Steel Castings Co., Benton Harbor, Mich., as foreman, has been made general foreman of the Electric Steel Company of Indiana, Indianapolis.

John E. Jordan, who has been superintendent of the Steam Foundry Co., Worcester, Mass., has resigned to take the direct management of the Pero Foundry Co., of the same city. Mr. Jordan has had nearly a quarter of a century of practical molding experience, and the foundry which now comes under his direction was one of the first plants to operate in Worcester.

F. F. Coutts has resigned his position as general foundry foreman for the Midwest Engine Co., Indianapolis, and has been made foundry superintendent for the Fulton Iron & Machine Co., St. Louis, maker of diesel engines and cane crushing machinery.

M. W. Seeman, one of the sales engineers of the Cleveland Osborn Mfg. Co., Cleveland, has been appointed director of European sales of this company with headquarters in London. Mr. Seeman will promote the sales of the molding machines manufactured by the company, throughout Europe.

R. S. Richards resigned as advertising manager and purchasing agent of the Atlas Car & Mfg. Co., Cleveland, Oct. 1, to become president and general manager of the United Roll & Foundry Co., Ravenna, O., which has been reorganized to manufacture rubber machinery and to handle jobbing castings. Mr. Richards was connected with the Atlas company for over 16 years.

B. H. Reddy has resigned as chief engineer of the National Roll & Foundry Co., Avonmore, Pa., to become associated with the Southern California Iron & Steel Co., Los Angeles, Cal. Mr. Reddy formerly was chief engineer of the National Pressed Steel Co. and designed and constructed the plant of that company at Massillon, O. In addition to his wide experience in steel plants, Mr. Reddy has been identified with iron foundry work, having been at one time superintendent of the Bowler Foundry Co., Cleveland.

Ray M. Cheney who has been with the Badger Co., Boston for the past two years, has resigned to take charge of a foundry near Calcutta, India, for the Bemis Brothers Bag Co., Boston. The Bemis Brothers company has a large jute textile mill in India for which they propose to construct all required machinery in that country, owing to the high importing costs. Mr. Cheney who will direct the foundry operations has purchased a complete sand blast equipment from the W. W. Sly Co., Cleveland, to be shipped to the India plant.

How Large Loam Molds are Dried

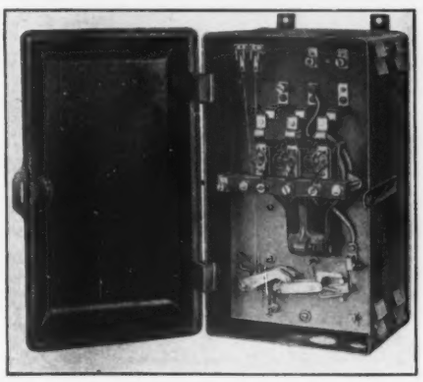
(*Concluded from Page* 755)

H and *B*, the pit is filled with sand; then a plate with brickwork or core sand, previously dried and still hot, is lowered to fill the opening, as shown at *K*, Fig. 1. Between the two plates soft loam should be placed to form a solid bearing. The open spaces, *M M*, are filled with a dry mixture of loam and if the top surface is not even with the original surface, it is leveled by filing or building-on. A thin sheet iron plate supporting a charcoal fire is laid over this filling to dry out the moisture.

Sometimes, when building the bottom of a loam mold that is very thick, it is advisable to partially dry the bottom brickwork before the upright portions of the mold are made; this can be done by raising the plate and building a wood fire underneath and a charcoal fire on top. After this the bottom can be set permanently where wanted. The best kind of fuel to use in the fire baskets will depend on the draft. Charcoal requires the least air, gas coke ranks next and followed in order by bituminous and anthracite coal and coke.

Induction Motor Starter

A new device for starting induction motors has been developed by the Electric Controller & Mfg. Co., Cleveland, which makes the operation practically fool proof. This device is controlled by a push button. It is enclosed in a steel box with conduit connections for all wires. Two wires, extending the length of the slate give over-load protection of the inverse time element type, both while the motor is starting and while it is running. The principle used is said to be new in motor starting practice. These two wires are stretched, and



PUSH BUTTON CONTROL BOX FOR INDUCTION MOTORS

the operating value of the overload protection is adjustable by changing the tension of the wire. If too much current is being taken by the motor, the wires will expand, causing the small contact at the bottom to be open and this will in turn, de-energize the magnet coil and cut the motor off the power line. It is then necessary to push the start button before the motor can be started.

Operation of Pneumatic Tools Shown

The members and guests present at the meeting of the Philadelphia Foundrymen's association held at the Manufacturers' club, Philadelphia, Oct. 8, were instructively entertained by moving pictures exhibited by Guy Gregory and F. E. Schwarze, of the Cleveland Pneumatic Tool Co. The pictures illustrated the operation of sand rammers, chipping tools, hammers, air compressors, and other foundry appliances made by the company. After the meeting the foundrymen were given opportunity to become better acquainted at a luncheon served in the club rooms.

Talks on Tractors

The regular monthly meeting of the New England Foundrymen's association was held at the Exchange club, Boston, Wednesday, Oct. 8. Dinner was served in the banquet hall after which Robert L. Lamont of the Mercury Mfg. Co., Boston, delivered a short talk on the application of tractors and other types of hauling equipment to foundry work. His talk was illustrated by motion pictures. H. D. Gates advertising manager of the Pangborn Corp., Hagerstown, Md., presented a paper, illustrated by lantern slides on the subject of cleaning castings with sand blast.

What the Foundries Are Doing

Activities of the Iron, Steel and Brass Shops

Hubbard H. Ericsson & Co., Chicago, is taking bids for the erection of a foundry, 22 x 40 feet.

A foundry, 60 x 80 feet, is under contemplation by the U. S. Carburetor Co., Omaha, Nebr.

The Yates & Johnson Co., Chippewa Falls, Wis., plans the erection of a foundry, 125 x 200 feet.

Fire recently damaged the plant of the Burnett Foundry Co., Petoskey, Mich.

Part of the plant of the Dayton Malleable Iron Works, Dayton, O., recently was damaged by fire.

The Bridgeport Brass Co., Bridgeport, Conn., has let a contract for the erection of a 164 x 225-foot addition to its casting plant.

Part of the plant of the American Car & Foundry Co., Terre Haute, Ind., recently was damaged by fire. Rebuilding will be started immediately.

Erection of a foundry building, 100 x 200 feet, is under contemplation by the Haywood Tire & Equipment Co., Indianapolis.

The Co-Operative Foundry Co., Rochester, N. Y., has had plans drawn for the erection of a plant addition.

Plans are being drawn for alterations to the plant of the Terminal Pattern & Model Works, Newark, N. J.

Construction of a foundry addition, 135 x 400 feet, is being planned by the Cleveland Co-Operative Stove Co., Cleveland.

Contracts have been awarded by the Modern Foundry Co., Cincinnati, for the erection of a pattern storage building, 4-stories, 60 x 160 feet.

Erection of a plant addition, 80 x 200 feet, is contemplated by the Anderson Foundry & Machine Works, Anderson, Ind.

The Security Stove Mfg. Co., Kansas City, Mo., has plans for the erection of a foundry, 60 x 100 feet.

Contracts have been let for the erection of a plant and foundry addition, 50 x 560 feet for the Ruddy Furnace Co., Dowagiac, Mich.

Plans have been completed for the erection of a foundry addition to include a core room, 45 x 60 feet, for the H. P. Deuscher Co., Hamilton, O.

Erection of an office and foundry building, 100 x 200 feet, is contemplated by the Monarch Foundry Co., Detroit.

Plans are being prepared for the erection of a foundry, 80 x 144 feet, for the A. E. Martin Foundry Co., Milwaukee.

The Fulton Foundry & Machine Co., 1209 Marquette road, Cleveland, recently awarded a contract for the erection of a plant addition, 100 x 111 feet.

Contracts have been awarded for the erection of an addition to the plant of the International Malleable Iron Co., Beverly street, Guelph, Ont.

The United Brass & Aluminum Co., Port Huron, Mich., is operating its new iron foundry. Albert P. Ryan is manager.

Contractors are expected to complete the erection of an addition to the plant of the Wilson Foundry & Machine Co., Pontiac, Mich., about Jan. 1.

The Tivani Steel Co., Belleville, Ont., plans the erection of a steel foundry. A. P. Gillies room 1950, 50 Church street, New York, is interested.

Erection of a foundry and general plant addition, 50 x 80 feet, is contemplated by the Enterprise Foundry Co., 1127 Warren avenue, Detroit.

Plans for extensions and improvements to its foundry have been prepared for the Union Steel Casting Co., Pittsburgh.

Architects are drawing plans for the erection of a foundry for the Minneapolis Steel & Machinery Co., Minneapolis.

Contracts have been awarded by the Coppus Engineering & Equipment Co., Worcester, Mass., for the erection of a brass foundry.

Four storage buildings and a pattern shop were

recently damaged in a fire at the plant of the Pittsburgh Model Engine Co., Pittsburgh.

Building operations are expected to be started soon on a foundry for the A. Garrison Foundry Co., Pittsburgh. The contract, which has been awarded, calls for a building, 120 x 190 feet.

Contracts have been awarded by the Burd High Compresion Ring Co., Rockford, Ill., for the erection of a foundry, 90 x 90 feet with a cupola, 20 x 20 feet.

Enlargement of its plant and an increase in its capital from $150,000 to $250,000, is contemplated by the Connellsville Foundry, Machine & Steel Castings Co., Connellsville, Pa.

Plans have been prepared for the erection of a plant for the manufacture of stoves for the Southern Stove Works, Hermitage and Leigh streets, Richmond, Va. The company is capitalized at $500,000.

Plans have been completed for a plant for the Manufacturers' Foundry Co., Waterbury, Conn. The plant will include a foundry, 50 x 120 feet, a storage building, and a shop 1-story, 50 x 50 feet.

The sale of $10,000 of additional stock for enlargements to its plant has been effected by officers of the Mt. Vernon Foundry & Engineering Co., Mt. Vernon, O.

Orders for new foundry and machine shop equipment recently were placed by the Southern Wheel Co., Birmingham, Ala., which is planning to enlarge its output of hollow-axle mine car trucks.

Engineers Smith, Hinchman & Gyrils, Whitney building, Detroit, are taking bids on a brass foundry to be erected at Marysville, Mich., for the Pressed Metals Co. of Canada.

Incorporated at Dover, Del., by T. L. Croteau, H. E. Knox and George W. Field, the capitalization of the Wheeling Mold & Foundry Co. was placed at $6,200,000.

Nicholas Remmer, Kewaskum, Wis., is reported reorganizing his foundry and machine shop business as a corporation, which when perfected will provide larger plant capacity.

Contracts have been awarded by the American Foundry Co., New Britain, Conn., for the erection of a foundry, 60 x 260 feet, with ells, 22 x 56 feet and 31 x 42 feet.

Clarence M. Grace recently purchased the Huntsville Foundry & Machine Shop, Huntsville, Ala. The new owner will make extensive improvements to the plant.

The Wincroft Stove Co., Middletown, Pa., has a site in Philadelphia, on which it is planning to build a plant, according to a report. E. N. Colquhor is in charge.

The Slinger Foundry & Machine Co., Portage, Wis., is contemplating the erection of a plant addition and plans to build the foundations of the building before winter, completing the structure early in the spring. H. W. Slinger is manager.

D. J. Kyan of the Allyne-Ryan Foundry Co., Cleveland, and Edward Verlinden of the Olds Motor Car Co., Lansing, Mich., are reported planning the erection at Lansing, Mich., of a foundry to be devoted to the manufacture of automobile parts.

A tract of land in the Indiana Harbor factory district has been purchased by the American Steel Foundry Co., Hammond, Ind., and according to a report, the site will be used for future plant extensions.

The plant formerly operated at Lorain, O., by the Brown-Cochran Co., and of recent years the property of Charles A. Otis, has been purchased by the Aetna Steel Casting Co., Cleveland, and two furnaces will be installed for the production of large and small castings.

The Eagle Foundry Co., Minneapolis, Minn., associated with the J. W. Bryant Co., is having plans prepared for the erection of a foundry, 65 x 120 feet. H. D. Asleson, 3055 Fifteenth avenue, Minneapolis, is engineer in charge.

Rost, Angstman & Briese, Inc., New York, has been incorporated with $50,000 capital, by R. W. Angstman, A. G. Briese and N. G. Rost, 637 Greene avenue, Brooklyn, N. Y., to manufacture machine shop and foundry equipment.

Contracts have been awarded by the American Locomotive Co., Chester, Pa., for the erection of two extensions to its plant. One will be a machine shop, 60 x 350 feet, and the other a foundry, 175 x 600 feet.

The Collinwood Foundry & Mfg. Co., Cleveland, recently was incorporated with $150,000 capital, by D. J. Zinner, F. F. Spurney, E. M. Chaloupke and C. J. Zinner, 312 Society for Savings building.

The Toledo Machine & Tool Co., Toledo, O., has started the erection of a new plant to be operated in connection with its present works. The plant will include a foundry, 153 x 378 feet, and a machine shop, power house and other buildings.

The Sydney Foundry & Machine Works, Ltd., Sydney, N. S., is contemplating the erection of a large plant addition. Details are not available at the present time as the company's plans have not definitely matured.

Announcement has been made that the American Car & Foundry Co. will build a plant in Chicago, to be devoted to the manufacture of steel cars. It is expected the buildings will be completed within six months, according to present plans.

Work has started on the erection of a plant for the Lewis Steel Products Co., Toledo, O., valve manufacturer. The main buildings will consist of a foundry, 80 x 300 feet, a machine shop of the same dimensions and a 2-story office building. A. R. Chase is president of the company.

Capitalized at $100,000, the Bridgeport Castings Co. will engage in the manufacture of brass, bronze and aluminum castings. It will utilize the plant formerly occupied by the Bridgeport Tube Works. The incorporators are Harry B. Houghton, Edward P. Quinn, Torrington, Conn., Thomas R. Good and William H. Managan, Waterbury, Conn.

At the present time, L. G. Williams, East View Farm, R. 6, Box 50, Hopkinsville, Ky., is organizing a company to manufacture a special line of farm and mining machinery. A small iron foundry, equipped with all modern appliances, will be built, as will an up-to-date brass foundry, machine, blacksmith, forge and pattern shops.

The plant and equipment of the Delta Foundry & Machine Corp. has been taken over by J. F. Shea, the plant's former manager. A new partnership between Mr. Shea and his former foreman, Mr. Dixon, has been formed to operate the plant on nonferrous casting work under the name of the Marine Castings Co., 116 Fifty-seventh street, Brooklyn, N. Y.

The Merrill Iron Works, Merrill, Wis., has changed its corporate style to Merrill Machinery & Supply Co. Under the reorganization, F. E. Taylor has become president. The company will continue to manufacture castngs and do general machine construction and repair work, but is adding a department for jobbing machine tools, machinery and supplies of all kinds for the shop, factory and mill.

Purchase of property on which is being erected a 4-story, 50 x 100-foot plant, recently was affected by the Johnson Auto Signal Co., Vancouver, Wash. The lower floor of the building will be used as a machine shop and for a brass and aluminum foundry. The upper floors will be utilized for office and assembly rooms. C. A. Bourne is secretary and treasurer of the company.

Gray iron, brass, bronze and aluminum castings will be manufactured by the Chemung Foundry & Supply Co., Inc., Elmira, N. Y., which was recently incorporated with $50,000 capital. The company was incorporated by Harry N. Rubin, J. P. Ward, John D. Ward and G. L. Siegel. The company is now purchasing machinery and equipment and expects to be operating within the next five weeks.

Expenditure of between $300,000 and $500,000 in the construction and equipping of six additional buildings is reported contemplated by the C. & G. Cooper Co. Gas engines will be manufactured in the new units, which according to report, will consist of a pattern storage building, 120 x 470 feet, an enlargement of the present machine shop, a cleaning room, 108 x 120 feet, a foundry addition, a woodworking shop and an erecting shop.

Organization of the Erickson-Young Pattern & Mfg. Co., Beaver Dam, Wis., recently was effected. The company will manufacture wood and metal patterns for the general foundry trade and will conduct a machine shop. The principal owners are James Erickson, formerly of the Western Malleables Co., Beaver Dam, and Harry Young, who has been associated with the Standard Steel Car Co. at that company's Beaver Dam shops.

The H. S. Lee Foundry & Machine Co., Plymouth, Mich., has started production in its new plant.

A new issue of $600,000 7 per cent preferred stock, recently put out by the Chain Belt Co., Milwaukee, has been oversubscribed. The company has increased its capital from $300,000 to $1,000,000 and plans the erection of extensive plant additions. Contracts have been awarded for the first unit, 160 x 316 feet, which when completed will be temporarily used as a concrete mixer assembly shop, but will be converted into a foundry after a third unit has been completed, early in 1920.

The Framingham Foundries, Framingham, Mass., have been reorganized through the purchase of the controlling interest by the B. F. Sturtevant Co., Hyde Park, Mass. The new organization is operating under the name, Framingham Foundries, Inc., and has as its new officers, Noble Foss, president; W. Emerson Barrett, vice president; G. L. Briddy, treasurer, and John J. McElroy, chief engineer. The Sturtevant Co. has closed its foundry at Hyde Park, and in the future will obtain all its castings from Framingham. The old foundry building will be remodeled as an addition to its general plant.

The Dearborn Iron & Power Co., capitalized at $500,000, with offices at Dearborn, Mo., and Kansas City, Kans., has been incorporated to take over the plant and assets of the Kansas City Malleable Foundry, the Kansas City Pattern Works, National Machine & Construction Co. and the Star Brass Works. The new company will manufacture malleable, semisteel, gray iron, brass and aluminum castings, as well as operate pattern and machine shops. Modern equipment has been purchased and the company expects to soon have in operation at Dearborn, Mo., a large foundry specializing in light soft gray iron castings for machine work.

New Trade Publications

LADLES.—The Whiting Foundry Equipment Co., Harvey, Ill., has published an illustrated booklet, in which crane ladles, truck ladles, slag truck ladles, bottom tap ladles, teapot spout ladles, shank ladles, trolley ladles, car wheel ladles and reservoir ladles, for use in modern foundries, are described and illustrated. Data given include construction, capacities and other specifications useful to those interested in such equipment.

MOTOR-DRIVEN TOOLS.—Bulletin No. 103, prepared by the Stow Mfg. Co., Inc., Binghamton, N. Y., contains descriptions and illustrations of tools manufactured by the company. Those described are heavy-duty drills, hand drills, portable drills, buffer and grinder, general utility tools, screw driver, flexible grinder, grinder for lathe carriage or tool post, etc. All are motor-driven. Specifications and other data concerning each tool are given.

REFRACTORY SAND.—A small booklet devoted to a refractory granular material for use in lining and repairing annealing furnaces, forging furnaces, heating furnaces, open flame melting furnaces, pit crucible furnaces, tempering furnaces, furnace doors, ladle heaters, coke oven floors, gas retorts, flues and chambers, glass lehrs, and to make standard and special shapes for furnace walls, arches, crucible blocks, gas carburetors, etc. The material, according to the booklet, is manufactured in the electric furnace by fusing at a high temperature a mixture of natural silica and petroleum coke. The booklet contains a number of illustrations.

METALS.—Descriptions and analyses of the various grades of slab zinc are given in a 12-page booklet recently published by the New Jersey Zinc Co., New York. Mention is also made in the booklet of spiegeleisen and bullion.